THE MIKADO MESSENGER

2007 PRINCE OF WALES

Building Britain's Most Powerful Steam Locomotive

Forging an inside connecting rod strap at Stephenson (Engineering) Ltd - *Robert Stephenson/A1SLT*

Welcome to edition No. 74 of The Mikado Messenger, our monthly eNewsletter which aims to provide a regular progress update on the construction of new Gresley class No. 2007 *Prince of Wales*.

As you will read elsewhere in this issue of The Mikado Messenger, significant progress is being made on all current areas of activity including both of our new boilers, where assembly of the first boiler is underway, the heavy motion and the cylinder block.

Due to the ongoing COVID-19 situation, our staff are still working from home or at Darlington Locomotive Works (DLW) where they are taking all the necessary precautions. The Works remain closed to volunteers, non-essential staff and visitors. We hope you understand that these circumstances are beyond our control and the restrictions are very necessary at this challenging time. We are reviewing all our activities on a frequent basis to protect everyone involved with the Trust and to secure our long-term future. Please keep an eye on our website and Facebook pages for updates, call 01325 460163 or email enquiries@p2steam.com if you have any questions.

FUNDRAISING UPDATE

A P2 for the price of a pint of beer a week: over 940 supporters have signed up as Covenantors for No. 2007 *Prince of Wales*, from as little at £2.50 per week, and are now kindly donating over £205,000 annually including Gift Aid. If you haven't yet signed up as a Covenantor we would encourage you to get on-board. You can find more information here.

The Boiler Club has reached 208 members, leaving just 92 spaces available - passing the two-thirds milestone. As substantial progress is now being made on our boilers, we would urge those who haven't yet contributed towards the purchase of No. 2007 *Prince of Wales'* boiler to join us. This is the single most expensive component on the locomotive and the boiler for No. 2007 is due to be delivered to Darlington Locomotive Works (DLW) in 2021. More information about The Boiler Club can be found here.

The Tender Club is still filling up slowly, with 89 places taken - over one third of the initial target. In order to keep on schedule to complete No. 2007 within three years, we need to complete the manufacture of the tender frames. Our target for The Tender Club is 250 members, contributing £1,500, so if you would like to contribute towards the tender more information can be found here.

We launched **The Turbogen Club** in July and the fundraising campaign has already 'generated' 24 members - over half of the initial target. Our target for The Turbogen Club is 40 members, contributing £1,000, so if you would like to contribute towards the turbo-generator more information can be found here.

Our newest fundraising campaign, **The P2 Support Coach Appeal**, was launched in August to acquire, overhaul and convert BR Mark 1 BSK E34547 into the support coach for No. 2007. Our target is to raise £100,000 from 100 supporters each donating £1,000. We have already recruited 35 supporters - over a third of the initial target - and if you would like to contribute towards this appeal more information can be found here.

The Motion Club has now reached our initial 175 members target. As you will see below, the machining of the second pair of coupling rods is underway. You can find more information about The Motion Club here - help us to fund the manufacture of No. 2007's motion!

The Pony (Truck) Club, has attracted substantial interest and has galloped past its initial target. You can find more information about The Pony (Truck) Club here - help us to fund the manufacture and

certification of No. 2007's pony truck.

You can sponsor components of No. 2007 *Prince of Wales* from as little as £30, ranging up to £15,000! The **Dedicated Donations** scheme has already raised over £400,000. If you would like to sponsor a component, please email dedicated.donations@p2steam.com, detailing the amount you would like to donate and/or if you had a specific part of the engine in mind, we will then send you some component recommendations to suit your donation.

To-date, over £2.5m has been spent and more than £3.0m raised of the required £5m to complete No. 2007 *Prince of Wales* within the next three years.

If there are any surplus funds left when our fundraising clubs have fulfilled their nominated purpose, we will use the money to buy other components for the Gresley class P2 that the charity would not otherwise have.

ENGINE FRAMES UPDATE

Rear frame stretcher bending jig - *A1SLT*

Summary: engine's frames erected; all major frame stays, brackets, horn blocks, axle boxes & buffers cast and fitted using around 1,000 driven bolts.

Progress update: with the tender tank undercoating complete it has been possible to remove the wheelsets from under the engine frames. This has permitted fitting of the remaining driven bolts and cold turned rivets in the outside motion brackets and the spring hangers.

Next steps: profiles for the shelf under the cab have arrived - Ian Matthews has prepared a special jig which should allow him to carefully heat up the plate and bend it at the exact location - this process

requires a lot of skill (and a force) as the plate is 20mm thick!

Fundraising: The Founders Club was established in September 2013 to give the project a racing start and get it to the point of erecting the engine's frames with a target of raising £100,000 plus Gift Aid from 100 supporters each donating £1,000. The Founders Club closed in July 2014 having attracted 360 members and raised around £450,000.

PONY TRUCK UPDATE

Pony truck frame machining, at NVES - *A1SLT*

Summary: redesign of the pony truck, using side control springs, has been completed; order for pony truck frame fabrication placed with North View Engineering Solutions (NVES) in Darlington; pony truck wheelset and cannonbox delivered.

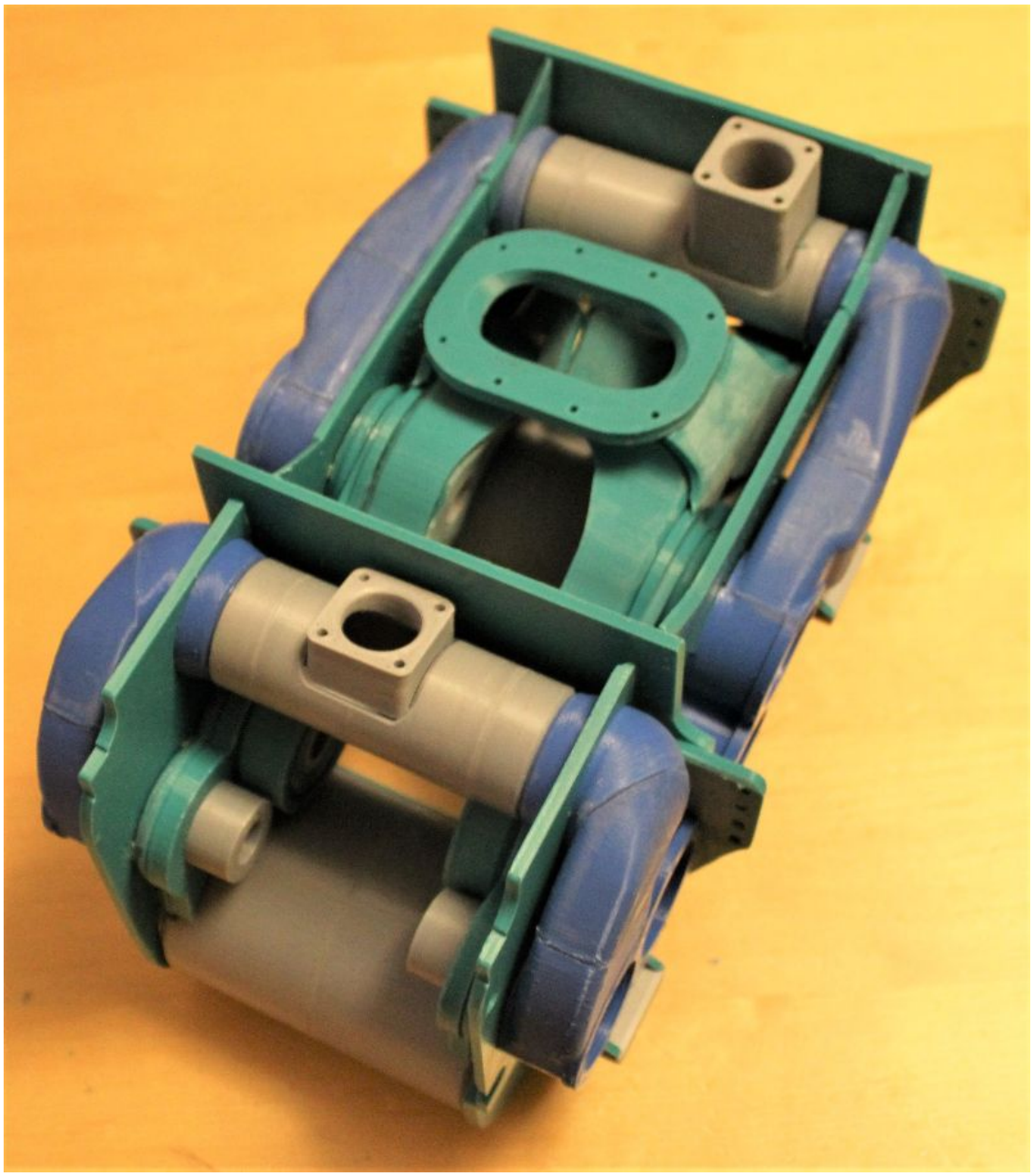
Progress update: at present, NVES is in the last stages of pony truck fabrication; manganese steel liners, side spring pads and vertical spring locating hollow spigots have been welded on and the whole

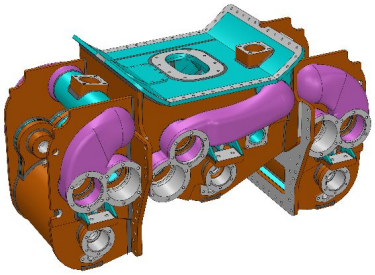
fabrication set up on a horizontal borer; the manganese steel liner will be brought to a correct dimension and the whole fabrication will be assembled and rechecked for a dimensional compliance.

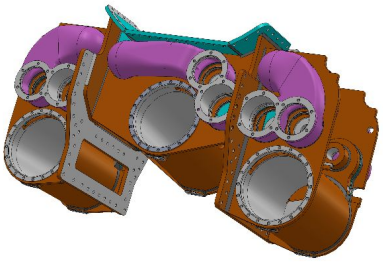
Next steps: completion of machining of principle components; manufacture of spring gear details; final assembly of the cannonbox onto the wheelset; machining of the spring planks and bearer cup and spherical side bearers; arrival of pony truck at DLW and final dimensional check.

Fundraising: in April 2020, we launched a £20,000 appeal – The Pony (Truck) Club – to fund the construction of the leading pony truck for No. 2007 *Prince of Wales*. We set a minimum target of 20 generous supporters willing to donate £1,000 plus Gift Aid (in up to four payments of £250) but this mini-club has galloped away and already passed its initial target. We have therefore decided to extend the club by a few members to cover the considerable certification costs associated with the modified pony truck design. Please consider joining The Pony (Truck) Club in advance of the frame's delivery to DLW. For further information click here.

CYLINDERS UPDATE







Partially complete 1:8 scale 3D model of cylinder block; 3D CAD images of cylinder block with welds, liners and valve seats top rear (image on left-hand side) and underside front (image on right-hand side) - *Alan Parkin/A1SLT*

Summary: design studies into cylinder block manufacture and selection of valve gear complete; 3D CAD design of the cylinder block and valve gear substantially complete; further progress has been made in applying the weld details to the cylinder block inside exhaust passages with particular attention being paid to the order of fabrication to ensure that all welds can be completed properly.

Progress update: cylinder block 3D CAD model refined and coloured to assist potential manufacturers in quoting for fabricating; 1:8 scale model 3D printing complete and model assembled to produce a PowerPoint slide show to demonstrate assembly sequence; request for Expression of Interest packs prepared to go out to a number of fabrication/machining companies; Frewer and Company Engineers Ltd of Dorking has been contracted to carry out a Computational Fluid Dynamics (CFD) study of the cylinder block to check for any features that may impede steam flow - the results will enable us to optimise detailed design of steam and exhaust ports to maximise the efficient use of steam; Alan Parkin is producing the full set of detailed 2D drawings needed to enable the shortlist of suppliers to provide a fixed price to manufacture the cylinder block; valve gear and other detailed design has been held up through shortage of 3D drafting capacity for some time, so we are pleased to announce that we have taken on Martin Shepherd, formerly a designer with Jaguar Land Rover and leader of the team that rebuilt a narrow gauge locomotive based on the Leighton Buzzard Light Railway, on a short term contract to help us over the peak of detailed design/drafting.

Next steps: refinement of detailed design following receipt of CFD results; completion of detailed manufacturing drawings; assessment of Expressions of Interest from suppliers, preparation and despatch to shortlist of full manufacturing specification and drawing set.

Fundraising: The Cylinder Club was founded in October 2017 to fund the redesign and manufacture of the cylinder block with a target of raising £100,000 plus Gift Aid from 100 supporters each donating £1,000. The Cylinder Club closed in March 2018 having achieved its target.

BOILER UPDATE

A stuffing box on the milling machine at DLW - *A1SLT*

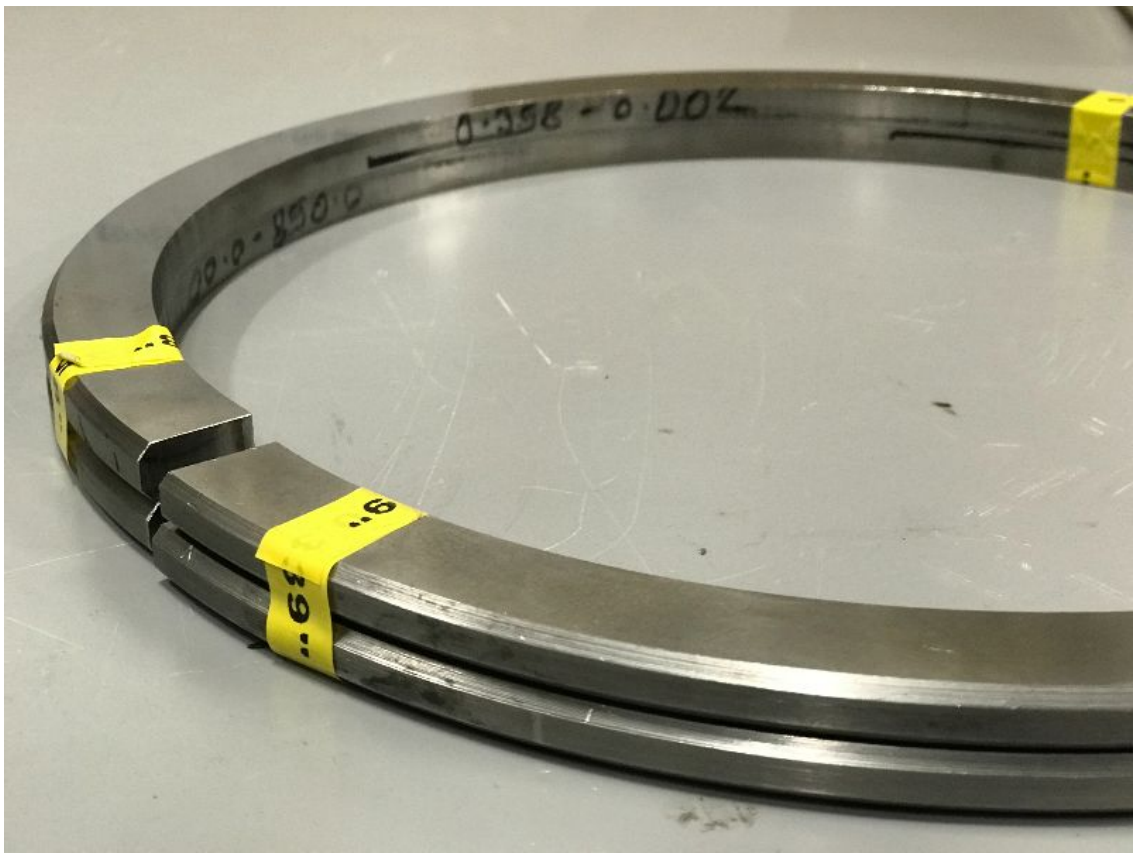
Summary: boiler design study completed, revised design approved by TüV Sud notified body and sent to UK authorities for information and comment and no adverse responses have been received; forged foundation ring corners manufactured and machined; regulator castings delivered; superheater header cast and machined; boiler cladding manufactured, trial fitted to frames and now in storage; boilers order placed with DB Meiningen (DBM) for delivery in 2021; foundation ring forgings and regulator castings despatched to DBM; minor re-design of the banjo dome to suit the P2 cladding completed by DBM; major progress on manufacture of the boiler and its components including the assembly of the barrel sections and marrying up to the inner firebox for the first boiler.

Progress update: DLW is manufacturing the regulator cross shafts and stuffing boxes which are required to set up the regulator mechanisms inside the boilers and to conduct the hydraulic tests; at DBM, all the basic components have been manufactured so uniting of the main sub-assemblies is underway and the first boiler is beginning to look like a boiler; the regulator cross shaft has been welded onto the crank (which operates a link between a cross shaft and a regulator) and subjected to Non-Destructive Testing (NDT); the shafts are awaiting a special process of applying melted sifbronze onto the shaft's bearing surfaces and then they will be machined to a required dimension, inspected and sent to DBM; work on the stuffing boxes moved to the next phase which consisted of establishing critical points in 3D space and machining the castings according to the drawing.

Next steps: full assembly of boiler barrels and firebox shells; fully machine two sets of stuffing boxes and apply and machine sifbronze onto the bearing surfaces of regulator cross shafts.

Fundraising: The Boiler Club was founded in October 2017 to fund the design modification and manufacture of the boiler with a target of raising £600,000, plus Gift Aid, from 300 supporters each donating £2,000 in up to 16 payments of £50. As of today, The Boiler Club has attracted 208 members who have generously donated over £410,000, excluding Gift Aid. For further information click here - we must reach our 300 members target in 2021.

WHEELSETS UPDATE



Pony truck bearing spacer ring - *A1SLT*

Summary: study into ride and suspension completed using Vampire® software; crank axle re-designed to comply with modern standards, approved and manufactured; all engine wheelsets complete and trial-fitted to engine; cannon boxes ready for final fitment to intermediate and trailing coupled wheelsets.

Progress update: Ian Matthews has completed the additional machining of the lower coupled cannonbox halves to enable the spring links to be fitted - the castings being slightly oversize in this area have required additional machining; Ian has also altered the shape of spring links around their lower circumference so they are free to rotate when inserted into axle and cannon boxes - this is due to the nature of the corresponding castings; pony truck axlebox bearing spacers have been surface ground to the required thickness and are ready to be inserted into an axlebox assembly - once this task is complete, the axlebox will be re-measured for sideplay which is required for the bearings to maintain their service life.

Next steps: assembly of the intermediate and trailing cannonboxes onto their wheelsets.

Fundraising: The Mikado Club was founded in March 2016 to wheel the engine with an initial target of raising £200,000, plus Gift Aid, from 160 supporters each donating £1,000. This was extended in May 2017 (to also wheel the tender) to 200 supporters raising £250,000 plus Gift Aid. The Mikado Club closed in May 2018 having achieved its target.

MOTION UPDATE

Progress from Stephenson (Engineering) Ltd clockwise from top left: inside connecting rod forging; inside connecting rod strap forging underway; a leading coupling rod being machined; a mirror finish polished intermediate coupling rod (at DLW) - *Robert Stephenson/A1SLT*

Summary: all heavy motion ordered from Stephenson (Engineering) Ltd of Atherton; intermediate coupling rods (between second and third coupled wheelsets) were delivered to DLW in September and have been fettled and polished to a mirror finish; work continuing underway on other heavy motion; updated poppet valve gear design almost complete with first components in manufacture.

Progress update: new bronze white metal lined rod bushes are taking shape at one of our suppliers; machining of the leading coupling rods is complete and they should be delivered to DLW before Christmas; inside connecting rod and strap have been forged; trailing coupling rods have been heat treated prior to machining.

Next steps: maching of remaining coupling rods; forging of outside connecting rods; delivery of new bronze rod bushes which will be pressed into intermediate coupling rods; altering the design of the oil lids and commencing their machining; ordering bushes for the remaining coupling rods.

Fundraising: The Motion Club was founded in May 2018 to fund forging and machining of the heavy motion, with a target of raising over £210,000 including Gift Aid, from 175 supporters each donating £1,000 in up to eight payments of £125. As of today, The Motion Club has reached the initial target of

175 members, who have generously donated over £200,000. For further information on how to become a member click here.

TENDER UPDATE




Tender frame at I D Howitt; the tender tank in green undercoat; dummy axlebox to check fit of tender hornblocks; grinding hornblock to final fit - *Nigel Facer/A1SLT*

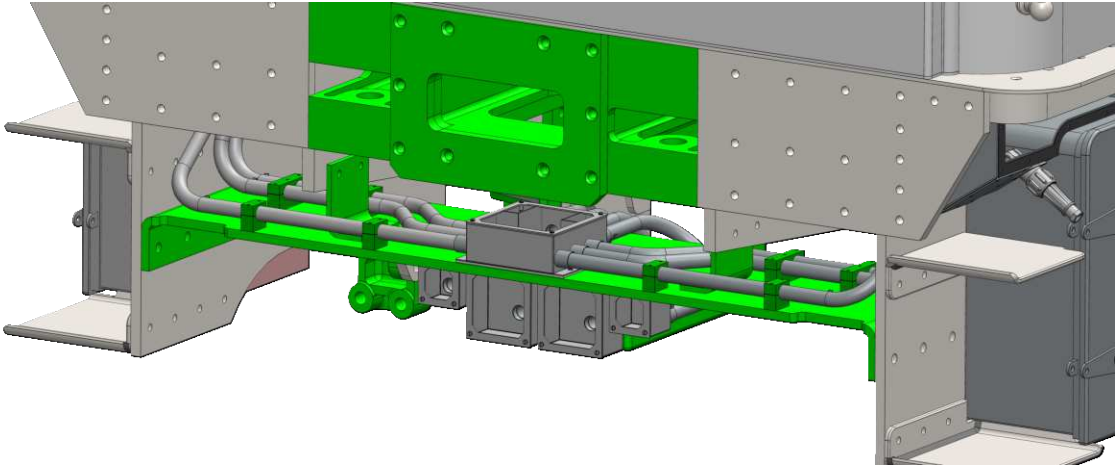
Summary: axlebox and other tender castings produced by William Cook Cast Products; frames being assembled by I D Howitt; tank construction complete, painted in green undercoat by Ian Matthews and now stored outside under a tarpaulin to create more space inside DLW; tender wheelsets at DLW, having been have been assembled South Devon Railway Engineering and painted by Ian Matthews.

Progress update: the hornblocks have had their manganese steel liners machined to finished size and are now temporarily bolted in their final positions for fitting of permanent driven bolts; in order to check that the hornblocks have the correct clearances between them, a dummy axlebox has been made and final adjustments are made by fine grinding.

Next steps: completion of the frames; continue 3D CAD work on tender electrical and pipework layout.

Fundraising: The Tender Club was launched in April 2019 to fund the construction of the tender, with a target of raising £450,000, including Gift Aid, from 250 supporters each donating £1,500 in up to eight payments of £125. As of today, The Tender Club has so far only attracted 89 members who have generously donated over £130,000 - we still have a long way to go to fund the tender's construction. For further information on how to become a member click here.

ELECTRICALS UPDATE



3D CAD image attached of the shelf at the rear of the engine which shows the trunking above and below it - *Alan Parkin/A1SLT*

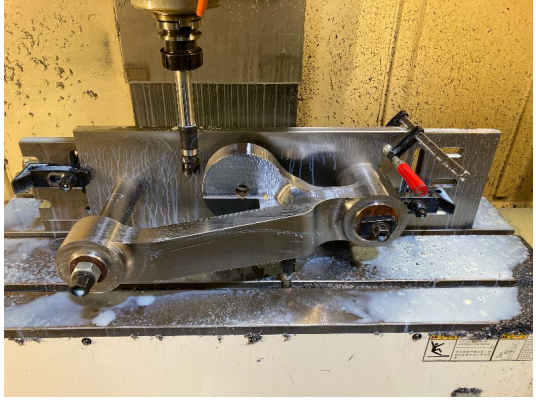
Summary: further good progress on the design of the electrical system; headlamp optical system refinement underway; electrical system risk assessment and standards compliance checks proceeding well.

Progress update: work continues on the electrical system with the recent focus on refining the headlamp optical system performance and documentation; work with Alan Green and Roger Millington to optimise the performance of the three lamp aspects (head, tail and marker) is making good progress; a first draft Hazard Log has been produced and reviewed internally - this will now be filled-out for a further draft for review by Ricardo; table showing all applicable standards has been created and reviewed internally, this will now be turned into a partially complete clause-by-clause compliance matrix for review by Ricardo.

Next steps: the turbogen startup circuit will be tested on *Tornado* once it is steamed on completion of annual maintenance in January - it will be modified where necessary and then incorporated into the Turbogen Switch Box schematic; optimisation of the headlamp optics and drivers will continue; work on electrical risk assessment and standards compliance will proceed, including the Hazard Log and clause-by-clause compliance matrix.

Fundraising: We launched The Turbogen Club in July and the fundraising campaign has already 'generated' 24 members - over a third of our target. Our target for The Turbogen Club is 40 members, contributing £1,000, so if you would like to contribute towards the turbo-generator more information can be found here.

MISCELLANEOUS FITTINGS



At Triple T Engineering Ltd: a Y shaped brake hanger on a CNC machine; a finished Y shaped brake hanger - Neil Somers/ *A1SLT*

Running Gear

Summary: brake gear fully designed and mostly manufactured, drain cock linkage (based on A1 design) drawn; linkage components made.

Progress update: good progress is being made installing the cylinder drain cock linkage which has been adapted to the very reliable design on *Tornado* to replace the less reliable cable operated system used on the original P2s; brake hangers for trailing wheelset have been trial fitted with trailing brake stay beam - this resulted in minor tweak on one of brake hanger thicknesses which resulted in a correct side play to be achieved; final fitting of crown nuts with washers and brake hanger pins, attached onto the frames, drilled to lock crown nuts in place; Edward Laxton has machined brake cross shafts bronze bushes from castings and these have been fitted onto the combined spring hanger brackets to allow the fitting of the brake cross shafts; the spare *Tornado* brake cylinder has been reassembled so that it can be tried in the frames for alignment and geometrical checks with the cross shafts coupled to the cylinders.

Next steps: wheelsets have been removed from the frame, to enable the brake cross shaft bearing bushes to be completed and the brake shafts installed; cylinder drain cock linkage to be installed between the frame; measurement of the lateral clearance between brake cross shaft bushes and shafts to determine the actual side play and to adjust the bronze bushes; anticipating receipt of the rest of the six Y shaped brake hangers, from Triple T Engineering Ltd - we have started the assembly and trial fit of the brake system.

New and recovered Yorkshire GHD fittings - *A1SLT*

Pipework

Summary: the design is well advanced and installation under way.

Progress update: Alan Parkin has continued modelling the pipework through the tender; production of 2D manufacturing drawings of the copper pipework through the engine have begun, the earliest of which for the air reservoir and air brake pipes are complete; quotes have been obtained for the metric copper pipe and Yorkshire GHD pipe fittings required for the entire air system and the steam heating pipe through the full length of the locomotive and these will be ordered shortly; thorough search through DLW has uncovered a small number of new unused GHD fittings and a larger number of used fittings originating from the build and subsequent modification of *Tornado*'s pipework - these have been cleaned and refurbished where safe to do so and will save in excess of £2,000 in buying new fittings.

Next steps: continuation of 2D design of pipework details; ordering of long lead items; quotations are being sought for the imperial pipework for steam and water along with the materials to make the numerous LNER style pipe fittings.

Fundraising

The Dedicated Donations scheme was founded to fund numerous components including the non-ferrous fittings and has raised over £400,000 to-date with new parts being frequently made available for sponsorship. For further information, click here.

P2 SUPPORT COACH UPDATE

BR Mark 1 BSK E35457 at Grand Central Railway - *A1SLT*

In November, BSK 35457 was moved from North Norfolk Railway to Great Central Railway by Reid's Transport Services. The move went off without a hitch and we are grateful to our friends at North Norfolk Railway and Great Central Railway for their help in making this happen. As soon as lockdown restrictions permit, we shall conduct a full survey of our new acquisition to plan the work we wish to undertake to improve the vehicle for our own use. The additional features we have on *Tornado's* Support Coach make operations and living on the coach so much easier and we will look to add these to BSK 35457 in time. A support coach is an essential vehicle for both the locomotive and the support crew, carrying all the tools and consumables needed to manage the locomotive on main line tours and on visits to preserved lines.

A unique opportunity arose for A1SLT to acquire BR Mark 1 BSK E35457 for eventual use as the support coach for No. 2007 *Prince of Wales*. Brake Corridor Second (BSK) E35457 was built at Wolverton in 1963, is fitted with Commonwealth bogies and was most recently used as the support coach for BR standard class 4 No. 76084. In surprisingly excellent condition, E35457 will require minimal work other than the reinstatement of its dual-brakes and the addition of a similar electrical system to that fitted to E21249, No. 60163 *Tornado's* support coach.

Fundraising: The P2 Support Coach Appeal was founded in August to fund the acquisition and overhaul of a support coach for No. 2007 *Prince of Wales* with a target of raising £100,000 from 100 supporters, each donating £1,000 in up to eight payments of £125. As of today, The P2 Support Coach Appeal has attracted 35 members - over one third of the intial target. For further information on how to become a member click here.

Progress on No. 2007 *Prince of Wales - A1SLT*

TRAVEL WITH *TORNADO*

No. 60163 *Tornado* hauling 'The Ticket to Ride' on 19th September 2020 – *Alan Weaver/A1SLT*

We are very much looking forward to our 2021 programme of tours and welcoming passengers on board. Our new brochure has just been published with a variety of tours through the year. We hope you find something of interest.

Railtours 2021 Diary

- Saturday 13th February - Valentine's Luncheon Circular Tour - from York, Thirsk and Darlington
- Saturday 13th February - Valentine's Evening Circular Tour - from York
- Saturday 13th March - 'The Ribblehead Rambler' - Hull to Carlisle and return
- Saturday 27th March – 'The Fens and Fells Flyer' - Cambridge to Carlisle and return
- Saturday 3rd April – 'The Aberdonian' - Edinburgh to Aberdeen and return
- Monday 5th April - 'The Clyde Aberdonian' - Glasgow to Aberdeen and return
- Saturday 10th April – 'The Caledonian' - Birmingham to Edinburgh and return

- Saturday 8th May - 'The Cumbrian Explorer' - Darlington to Carlisle and return
- Saturday 15th May - 'The Jorvik Express' - Liverpool to York and return
- Saturday 22nd May - 'The Pennine Explorer' - Leicester to Carlisle and return
- Thursday 22nd July - 'The Aberdonian' - Edinburgh to Aberdeen and return
- Sunday 31st July - 'The Aberdonian' - Edinburgh to Aberdeen and return
- Thursday 12th August - 'The Aberdonian' - Edinburgh to Aberdeen and return
- Thursday 19th August - 'The Aberdonian' - Edinburgh to Aberdeen and return
- Thursday 2nd September - 'The Aberdonian' - Edinburgh to Aberdeen and return
- Saturday 11th September - 'The Aberdonian' - Edinburgh to Aberdeen and return
- Thursday 16th September - *Tornado* and *Flying Scotsman* - West Midlands to Carlisle and return
- Thursday 16th September - *Flying Scotsman* and *Tornado* - Peterborough to Carlisle and return
- Saturday 18th September - *Tornado* and *Flying Scotsman* - Middlesbrough to Carlisle and return
- Saturday 18th September - *Flying Scotsman* and *Tornado* - Birmingham to Carlisle and return

Tornado Railtours trains can be booked through the links above, our website or by calling 01325 488215.

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