

THE MIKADO MESSENGER



2007 PRINCE OF WALES
Building Britain's Most Powerful Steam Locomotive



We have a 'Mikado'! Left-hand side coupling rods trial fitted to engine - *Mandy Grant/A1SLT*

Welcome to edition No. 84 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, the heavy motion, the cylinder block, the tender, the valve gear, the electrical system and pipework fitting.

Having commissioned Howco Group Plc to fabricate the new cylinder block incorporating steel castings supplied by William Cook Cast Products Ltd, in July 2021 we launched **The Cylinder Manufacturing Club** to raise the required £250,000. The aim is to raise an initial target of £250,000 from 250 supporters each donating £1,000 plus Gift Aid (in up to eight payments of £125) - **34 members have already joined**.

Our online donations system is live on at p2steam.com for signing up as a P2 Covenantor, joining any of the P2 fundraising clubs and contributing to The P2 Support Coach Appeal.

Our Darlington Locomotive Works Open Days are now back to their traditional open-house format on the first and third Saturdays of the month - please see below for more information.

FUNDRAISING UPDATE

A P2 for the price of a pint of beer a week: over 1,000 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 £250,000 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](#) - **now is the time to come on-board or recruit a friend!**

The Boiler Club has reached 231 members, leaving just 69 spaces available - over three-quarters of the initial target. **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 completed in summer 2022. More information about The Boiler Club can be found [here](#).

The Tender Club is starting to fill up, with 108 places taken - almost 45% of the initial target. In order to keep on schedule to complete No. 2007 within two years, we need to complete the manufacture of the tender frame this year. Our target for The Tender Club is 250 members, each donating £1,500, so if you would like to contribute towards the tender more information can be found [here](#). **Why not show a little Tender-ness and help us to reach 125 members by spring 2022.** We realise that the tender isn't the most glamorous part of *Prince of Wales* - but our locomotive can't operate without one!

Our latest fundraising campaign, **The Cylinder Manufacturing Club**, has been launched to raise the required £250,000 to fund Howco Group Plc's fabrication of the new cylinder block using steel castings supplied by our principal sponsor William Cook Cast Products Ltd. The aim is to raise an initial target of £250,000 from 250 supporters each donating £1,000 plus Gift Aid (in up to eight payments of £125) - **34 members have already joined.** More information about The Cylinder Manufacturing Club can be found [here](#).

Our recently launched mini-club, **The Injectors Club**, has been established to raise funds for the acquisition, manufacture and installation of live & exhaust steam injectors. It has an initial target to raise at least £50,000 from 50 supporters each donating £1,000 plus Gift Aid (in up to four payments of £250) - **the first 17 members have already joined.** More information about The Injectors Club can be found [here](#).

The P2 Support Coach Appeal was founded in 2020 to acquire, overhaul and convert BR Mark 1 BSK E34547 into the support coach for No. 2007. Our initial target is to raise £100,000 from 100 supporters each donating £1,000. **Having recruited 60 supporters we have passed the 60% mark.** If you would like to contribute towards this appeal more information can be found [here](#).

The Motion Club has now reached its initial 175 members target. We may have passed the initial target of The Motion Club but there is still an opportunity to come on-board before the final piece of heavy motion is delivered to DLW. You can find more information about The Motion Club [here](#) - **help us to complete the manufacture of No. 2007's motion!**

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 £440,000 (including Gift Aid). 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 locomotive in mind, we will then send you some component recommendations to suit your donation.

Altogether this means that we have raised over £4m of the estimated £6m required to complete No. 2007 *Prince of Wales* within the next two years (if Gift Aid is included).

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 FRAME UPDATE



P2's frame is filling up with pipework and electrical conduit - A1SLT

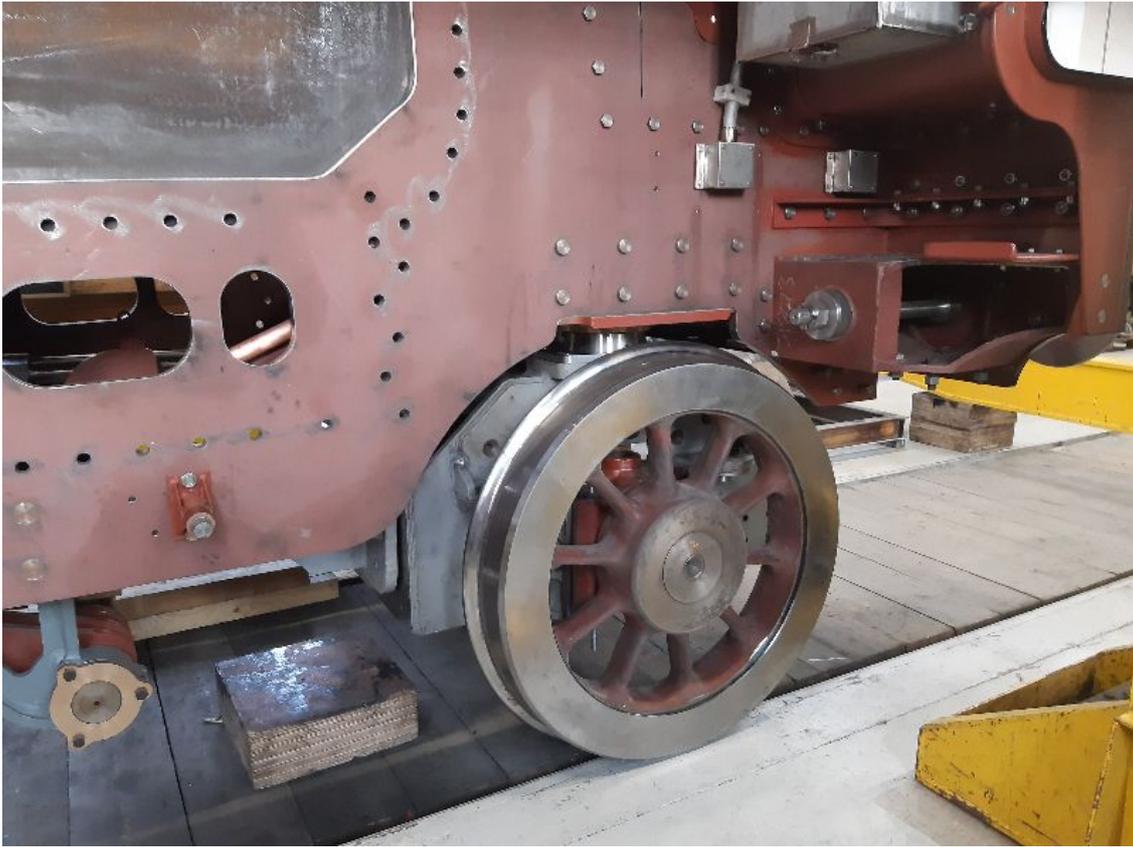
Summary: the engine frame is now substantially complete.

Progress update: the completion of the frame has allowed the installation of the air, steam & sand pipework and the electrical trunking between the frames to continue; with the electrical wiring design finished, it was necessary to run an additional conduit from the area of the turbogenerators on the right-hand footplate across to the turbogen control box immediately behind the buffer beam on the left-hand side of the engine which has now been completed.

Next steps: continue with various pipe runs - such as fully connecting air pumps - including all bespoke pipe coupling fittings.

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 frame 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



The pony truck trial fitted to the engine frame - A1SLT

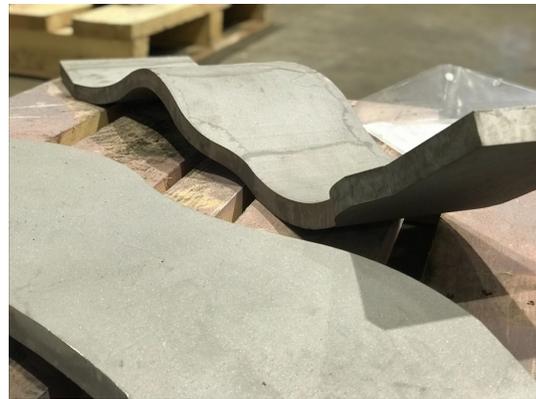
Summary: redesign of the pony truck using side control springs has been completed; the pony truck frame, crosshead and wheelset with cannonbox have been delivered to DLW.

Progress update: the pony truck has been trial fitted to the engine.

Next steps: continuing FEA study for approval of the new design and complete final machining.

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 each willing to donate £1,000 plus Gift Aid but this mini-club galloped away and reached 32 members. The club is now closed - thank you for your support.

CYLINDER BLOCK UPDATE



Manufacturing of the cylinder block at Howco, Irvine, clockwise from top left: machined side plates; compound angle detail; intricate shape of bent section; middle cylinder in an intermediate stage of fabrication clamped on a welding table; partially dismantled 3D printed model of the cylinder block used to guide welder; details of middle cylinder fabrication; cylinder with both front and rear plates welded on; blast pipe flange - Daniela Filova/A1SLT

Summary: design study into cylinder block manufacture complete; 3D CAD design of the cylinder block 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

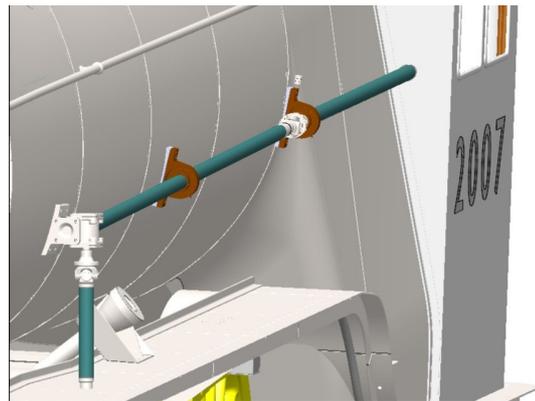
that all welds can be completed properly; Howco Group Plc at Irvine in Scotland contracted to fabricate and machine the cylinder block.

Progress update: Howco is making good progress having procured the materials, is well advanced in pre-machining of components and has started welding the middle cylinder assembly; William Cook Cast Products Ltd of Sheffield has completed the cast steel steam ports and delivered them to DLW where work is in hand to hydraulically test them; patterns for valve covers have been assembled and quotes are being sought for casting.

Next steps: continuation of fabrication of the cylinder block by Howco; casting of valve chest covers; machining of the cylinder cover castings; machining of the valve spring guides and covers plus various profiles which will all be required for hydraulic testing of the complete cylinder block.

Fundraising: in July 2021, **The Cylinder Manufacturing Club** was launched to raise the required £250,000 to fund the fabrication of the new cylinder block. The aim is to raise an initial target of £250,000 from 250 supporters each donating £1,000 plus Gift Aid (in up to eight payments of £125) - **34 members have already joined**. For further information click [here](#).

VALVE GEAR AND CAMBOXES UPDATE



3D printed cambox and screw; 3D CAD of side of boiler with reverser drive cardan shafts - A1SLT

Summary: selection of valve gear complete; concept design for modified Lentz/Frankin valve gear completed; 3D CAD design valve gear substantially complete; further progress in producing manufacturing drawings (79 to-date); patterns for valve covers and details manufactured.

Progress update: Martin Shepherd has largely completed manufacturing drawings for the cambox & its internal components and has worked up designs for lubrication of the valve spindles & oil coolers for the camboxes; the one-third scale 3D printed model of the cambox and its internals was on display at the convention.

Next steps: continued procurement of parts with a view to making a complete cambox for testing; completion of 2D manufacturing drawings; seeking manufacturers for the production items.

Fundraising: a fundraising campaign for the valve gear and camboxes will be launched in due course.

BOILER UPDATE



Substantial progress assembling the boilers at DBM - *DBM/A1SLT*

Summary: design study based on revised No. 60163 *Tornado* boiler completed; boilers order placed with DB Meiningen (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: construction progress at DBM means the delivery of the P2 boiler is now scheduled for July 2022 - all of the basic components have been manufactured and uniting the main sub-assemblies is underway; 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); regulator stuffing box assemblies completed.

Next steps: full assembly of barrels and fireboxes; site visit to DBM to check dimensional accuracy of boiler and to deliver regulator stuffing box assemblies, gaskets and blanking plates to facilitate hydraulic testing of the new boilers.

Fundraising: The Boiler Club was founded in October 2017 to fund the design modification and manufacture of the boilers 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 231 members who have generously donated over £450,000, excluding Gift Aid. For further information click [here](#) - we must reach our 300 members target by summer 2022.

WHEELSETS UPDATE



Engine frame lowered onto coupled wheelsets - *Steve Davies/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; cannonboxes ready for final fitment to intermediate and trailing coupled wheelsets.

Progress update: 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; the first set of left-hand and right-hand bearing spacers for the trailing cannonbox has been ordered and will be test fitted in both - these final measurements will be used to decide on a final thickness for all bearing spacers; a contractor has been found to balance the pony truck, Cartazzi and tender wheelsets.

Next steps: completion of the assembly of the intermediate and trailing cannonboxes onto their wheelsets including insertion of bearing spacers surface ground to a suitable thickness to achieve required side play for tapered bearings; establishing a programme for balancing the small wheelsets; fitting of manganese steel side liners to coupled cannonboxes.

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

MOTION UPDATE



We have a 'Mikado'! Left-hand side coupling rods trial fitted to engine - *David Elliott/A1SLT*

Summary: all heavy motion ordered from Stephenson (Engineering) Ltd and forgings complete; leading, intermediate & trailing coupling rods and outside connecting rods have been fettled and polished to a mirror finish.

Progress update: two outside connecting rods delivered to DLW; inside connecting rod and strap still being machined with delivery now expected in January 2022; left-hand side coupling rods trial fitted to engine.

Next steps: complete machining of inside connecting rod and strap; alter design of oil lids and commence their machining; press-in leading and trailing rod white metal bearings for right-hand coupling rods; make gradient pin details and trial fit right-hand coupling rods to engine.

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. We may have passed the initial target of 175 members of The Motion Club but there is still an opportunity to come on-board if you haven't already whilst the motion is being manufactured as there have been a couple of dropouts. **For further information on how to become a member click [here](#).**

TENDER UPDATE



The tender tank in green undercoat at DLW - Mark Allatt/A1SLT

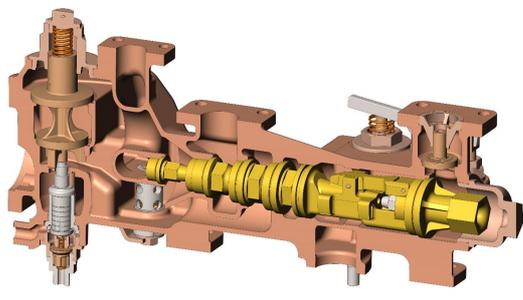
Summary: axlebox and other tender castings produced by William Cook Cast Products; frame being assembled by I D Howitt at Crofton; tank construction by NVES Ltd complete, painted in green undercoat by Ian Matthews and now stored outside under a tarpaulin to create more space inside DLW; tender wheelsets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

Progress update: all of the tender hornblocks have been fitted to the tender frame and work is now concentrated on the tender brake gear which is almost complete; following preliminary machining, axleboxes have had manganese steel liners welded on by CTL Seal of Sheffield and are now back at Crofton for final machining.

Next steps: completion of the brake gear and machining the axleboxes; continued 3D CAD work on electrical and pipework layout now ETCS cab signalling equipment fully defined.

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 fifteen payments of £100. As of today, The Tender Club has so far attracted 108 members who have generously donated over £160,000 plus Gift Aid - 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](#). **Why not show a little Tenderness: help us to reach 125 members by spring 2022.**

INJECTORS UPDATE



3D CAD Davies and Metcalfe class K exhaust steam improved injector assembly section with cones installed; Davies and Metcalfe 12mm LV live steam injector - A1SLT

Summary: a 3D CAD model of the Davies and Metcalfe class K exhaust injector has been completed by reverse engineering.

Progress update: the completed 3D model has enabled us to closely assess the pattern equipment kindly lent by the BR class 8 Steam Locomotive Trust, custodians of No. 71000 *Duke of Gloucester*, and identify the missing core boxes.

Next steps: produce 2D manufacturing drawings for the components and seek quotes to fully restore the pattern equipment and to obtain castings.

Fundraising: We launched The Injectors Club, a mini-club, in June 2021 to raise funds for the acquisition, manufacture and installation of live & exhaust steam injectors with an initial target of raising £50,000, excluding Gift Aid, from 50 supporters each donating £1,000 in up to four payments of £250. As of today, The Injectors Club has already attracted 17 members. For further information on how to become a member click [here](#).

ELECTRICALS UPDATE



Summary: detailed design of the smaller electrical circuits is approaching completion; work to specify lighting fittings is underway; the new ADA is undergoing testing at DLW with bench testing of ADA at a wide range of loads and speeds completed; the additional trunking run drawings are nearing completion.

Progress update: work on the newly designed and built axle driven alternator (ADA) by Rob Morland (our head of electricals) and his team continues.

The new ADA uses a 180A 28v truck/bus alternator fitted into a very solid steel casing to replace the Stones Altonum alternators the Trust presently uses which come off early British Railways mark 2 coaches (early 1960s). The latter are becoming very hard to come by and usually require complete (and very expensive) overhaul. Also, their regulators use 1960s transistors which are equally hard to find.

The Trust has fitted a 2.4:1 toothed belt drive system within the casing to get the alternator running at the required speeds from the axle pulleys on coaches or in our case the tenders on No. 60163 *Tornado* and No. 2007 *Prince of Wales*.

We built a test ring to check output, temperatures and endurance running, however we also needed to conduct EMC (Electro Magnetic Compatibility) tests. As the test ring comprises a squirrel cage induction motor with an electronic speed controller, it is likely to produce a significant amount of electrical noise in its own right. With this in mind it occurred to us that a suitable drive system for when EMC testing would be a medium sized traction engine - no electrical interference and it can test from the lowest to the highest speeds - using a large flat belt of the sort used for operating saw tables etc.

We used 1920 Leeds built 7NHP Fowler steam road engine *Providence* owned by Howard & Barry Stafford of Houghton-le-Spring - the engine comes complete with belt and is a two cylinder compound with a governor which makes it ideal for the task. Howard & Barry kindly donated their time and we supplied the coal. Our contractor Eurofins of York conducted the EMC tests on the morning of Thursday 21st October 2021 - and it passed with flying colours!

Our new design of alternator will eventually be fitted on No. 60163 *Tornado*, No. 2007 *Prince of Wales*, our proposed Gresley class V4 and their support coaches including E35457. All very *Titfield Thunderbolt* - or is it *Iron Maiden*?

This is another step on the way to the completion of No. 2007 *Prince of Wales* and another way in which the Trust is constantly finding new ways to ensure we can continue to operate steam on the modern main line railway by fitting all of the necessary electronic systems to our locomotives and provide the increasing amount of electrical power for them.

Next steps: installation on E21249 support coach for service testing.

Fundraising: The **Turbogen Club** reached its initial target of 40 members each generously contributing £1,000. The club is now closed - thank you for your support.

MISCELLANEOUS FITTINGS



Cylinder drain cock spindles; Edward Laxton, at DLW, screw cutting a cylinder drain cock - A1SLT

Running Gear

Summary: drain cock linkage (based on A1 design) drawn; linkage components made.

Progress update: Edward Laxton has finished the machining of all cylinder drain cock castings and their valve spindles; material for LNER-type fittings, bush and nut for cylinder drain cocks has been delivered.

Next steps: refurbish newly acquired air brake cylinders; machine LNER type fittings for cylinder drain cock exhaust ports.



A view of the brake gear from the pit - Leigh Taylor/A1SLT

Brake Gear

Summary: brake gear fully designed and mostly manufactured; linkage components made and fitted.

Progress update: trial fit of brake hangers, brake stays and brake blocks on frames

Next steps: set up of pull rods of brake gear for final welding to required lengths.

Fundraising

The Dedicated Donations scheme was founded to fund numerous components including the non-ferrous fittings and has raised over £440,000 (including Gift Aid) 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 in traffic at Great Central Railway - Rob Morland/A1SLT)

The A1 Steam Locomotive Trust has acquired 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. E35457 continues to reside at the Great Central Railway (GCR) and is pressed into service as a passenger-carrying vehicle when required and by agreement.

Planning continues to identify the work required to make best use of E35457 as a support coach for No. 2007 *Prince of Wales* when it begins operational service. In the meantime, work continues to overhaul a pair of Commonwealth Bogies for use with both support coaches: four wheelsets are currently being re-

tyred and a set of roller bearings has been delivered from Timken. We are now seeking the air brake equipment required to reinstate the brake system to make it dual braked and identifying the correct design and fit for a vehicle of this type.

Fundraising: The P2 Support Coach Appeal was founded in August 2020 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 **60** members - 60% of the initial target. For further information on how to become a member click [here](#). **Help us to fund this appeal!**

DARLINGTON LOCOMOTIVE WORKS OPEN DAYS - COME AND SEE OUR P2 PROGRESS

Our Open Days are back to their traditional open-house format on the first and third Saturdays of the month from 11:00hrs until last entry at 16:00hrs - please check the events page on p2steam.com, the [P2 Facebook page](#) or call the office on 01325 460163 for the current status. No. 60163 *Tornado* was completed at DLW in 2008 and visitors to the Works can see the spectacular progress that the Trust is making with its second new main line steam locomotive, Gresley class P2 No. 2007 *Prince of Wales*. During the working week, the Works remains closed to casual visitors - we hope you understand that these circumstances are beyond our control and these restrictions are still currently required.

If you can assist with our DLW Open Days please email volunteer@p2steam.com.

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.

BACK ON TRACK - P2 ROADSHOWS RETURN

Following on from the success of our previous P2 Roadshow programmes, we were delighted to be able to restart our Roadshows on Saturday 16th October at Peterborough albeit to a rather smaller audience than hoped for. Each presentation will feature key team members including Mark Allatt and/or David Elliott and will cover the background to the project to build new Gresley class P2 No. 2007 *Prince of Wales*, progress to-date, future plans and details of how to get involved. We would encourage you to attend one of these Roadshows and bring along some friends and family members who would be interested in hearing about the project. The two-hour presentations will start promptly at 11:00hrs and run until 13:00hrs on each of the days listed below and are open to existing supporters and interested members of the public:

NEW ROADSHOW PROGRAMME

- Saturday 29th January 2022 - London Transport Museum, London

Further dates will be announced over the next few weeks.



No. 2007 *Prince of Wales* - Mandy Grant/A1SLT

TRAVEL WITH *TORNADO*



No. 60163 *Tornado* at Retford hauling a previous 'Yorkshire Pullman' from London King's Cross to Scarborough on 15th June

2019 - Alan Weaver/A1SLT

We are very happy to announce some of the diary for next year which includes 'The Aberdonian' programme, from Edinburgh and Glasgow, and a special 'Belmond British Pullman' train on 9th July as we visit York and Harrogate. There is nothing better than main line steam, especially with *Tornado* at the

head of the train, so please have a look at the diary below - we look forward to welcoming you on-board.

Tornado Railtours 2022 Diary - these tours have been released - more to follow

- Saturday 9th July - [The Yorkshire Pullman](#) - London King's Cross to York & Harrogate and return
- Thursday 21st July 2022 - [The Aberdonian](#) - Edinburgh to Aberdeen and return
- Thursday 28th July 2022 - [The Aberdonian](#) - Edinburgh to Aberdeen and return
- Saturday 30th July 2022 - [The Aberdonian](#) - Edinburgh to Aberdeen and return
- Saturday 13th August 2022 - [The Clyde Aberdonian](#) - Glasgow to Aberdeen and return
- Saturday 20th August 2022 - [The Aberdonian](#) - Edinburgh to Aberdeen and return
- Thursday 1st September 2022 - [The Aberdonian](#) - Edinburgh to Aberdeen and return
- Thursday 8th September 2022 - [The Aberdonian](#) - Edinburgh to Aberdeen and return
- Thursday 15th September 2022 - [The Clyde Aberdonian](#) - Glasgow to Aberdeen and return
- Saturday 17th September 2022 - [The Aberdonian](#) - Edinburgh to Aberdeen and return

Tornado Railtours trains can be booked through the links above, our [website](#) or by calling 01325 488215.

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