AST Trust
Advancing Steam Traction

# NEWSLETTER No. 30 AUGUST 2026




**Jamie Keyte showing ASTT member Wolf Fengler Revolution**

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# CHAIRMAN'S PIECE
## John Hind

This is Newsletter 30 and is a milestone made possible by contributions, so thanks and congratulations to anyone who has written an article and special thanks to our editor, Iain McCall who turns all our contributions into a professional looking newsletter that we can all be proud of.

The first edition came out in June 2015 and has appeared 3 times a year since, with Cedric Lodge and David Nicholson as editors of the early editions and Chris Newman and I stepping in before Iain McCall came in as editor for Newsletter 16 in May 2021.

I continue to be staggered the eruditeness of the technical articles, which are on a par with articles in professional engineering journals. Long may it continue.

In preparing this piece, I have had a browse back through the first 10 issues up to July 2019 and can see recurring themes – future of coal, concepts for new locomotives, discussions on boiler performance, the first ideas for Revolution, talk about a new build for the Darjeeling Himalaya Railway (Owen Jordan writes about recent thoughts on this later in the newsletter), locomotive testing, lubrication, appeals for members to join us in running the group and what is particularly pleasing to see is pictures of our younger members, who are still with us and helping to run the group.

## 10¼" Gauge Society

In May of this year, we heard that the 'Ten & a Quarter Inch Gauge Railway Society' was winding up and wanting to donate their remaining funds to suitable groups and we were one such group.

The Ten & a Quarter Inch Gauge Railway Society was an internet-based organisation for everyone interested in miniature railways between 8 and 12½ inches and over the years had accumulated some funds.

The Society's aims were to promote and support miniature railways and was a nonprofit making organisation open to all, on payment of a modest yearly fee to cover expenses. The Society was not railway specific but operated as a complement to existing lines both private and commercial, to encourage safe practice within the hobby and industry and encourage the enjoyment of miniature railways by visits and social events. The aim was to encourage communication by sharing news, practical ideas, information, sales of stock etc on the Society website. It also encouraged the building of locomotives and rolling stock.

In July we received a very worthwhile and generous donation of £4968 from the Society, which will be used to fund Revolution. Many thanks to the Society for this generous donation, which fits in with their aim of 'encouraging the building of locomotives'.

In return we offered free membership till the end of 2027, to any of their members, who would like to join us. I am pleased to say that Rick Osman (ex Chairman), David Adams (ex Treasurer), Colin Hill, Jordan Whitfield and Bill Fone have joined us, with a few more in prospect.

## Conference 2026

The first flyer with the full programme has already gone out and the first bookings taken. Traditionally, most of bookings come in the two months before the conference, though from us as organisers the sooner the better, as at risk, we have had to make provisional bookings for the conference dinner. So please if you are coming, don't delay and book today. We will be able to sleep easier!

The nature of the programme is different to previous years as the Sunday has a trip on the NYMR to the new Mutual Improvement Class facility at Grosmont and a unique chance to hear first hand from Paul Middleton on the experiences with the oil firing on S160 2253 'Omaha'. Paul gave us memorable introduction last year; this promises to be even more interesting as the plan is to have the engine in steam for us.

## Revolution Funding

The biggest spend will be the boiler and we have already had one quote in which was much too expensive - far exceeding the 'market rate' for this size of boiler, although we had hoped this supplier would have been competitive. Other suppliers have been approached. Once we have a price and we know how much more needs funding, then we can put in place a funding plan from the donations and cash balances we have, though we must remember that there will be ongoing costs on an annual basis that need covering and we will need a reserve to cover them.

We have had two generous donations; one from a member of £5000 and one from the 10 ¼" Gauge Society mentioned earlier. These will go to funding Revolution.

Chris Newman has been working through the Charities Commission application form, so that we can be formally registered as a charity. Once submitted, the Charities Commission will review it and then there will probably be questions, but if approved, it should unlock circa £10,000 in Gift Aid.

The light at the end of the tunnel is getting brighter and although not there yet, I can see Revolution being funded and completed. When we have more news on the boiler, then we will let you know.

# MEMBERSHIP MATTERS
## Chris Newman

### Committee Members

ASTT's management committee :

| | | | |
|---|---|---|---|
| John Hind | Chairman & Trustee | Jamie Keyte | Trustee |
| Hendrik Kaptein | Secretary & Trustee | Alex Powell | Trustee |
| Chris Newman | Treasurer & Trustee | Grant Soden | Ex-officio |
| Mike Stockbridge | Ex-officio | | |

### New Members:

**David Rogers** from Chester, UK – mechanical engineer (M.Phil. PhD C.Eng. F.I.Mech.E.), currently working in automotive power-train engineering, Instrumentation and measurement systems. Has skills in technical sales, business development and leadership.

**Jack Lewis van den Berg** from Alberta, Canada – a 1st year apprentice working on pressure vessels. Volunteers at the Alberta Railway Museum.

**Adam Cottage** from West Sussex, UK.

**Henry Law** from Sweden – Henry has a BA Chemistry and a Diploma in Landscape Design. He has Contributed to Design magazine on transport topics and has worked with Wessex Traincare and Porterbrook on project for life extension of Mark 1 EMU fleet.

**Hans Alterna** from the Netherlands – IT systems manager and team builder. He's recently been project manager for 2454CREW Society and MD-RAIL 2025, and has led various railway projects in the heritage railway scene. He has many connections in the heritage railway scene in the Benelux and England and is keen to participate in projects with a vision and future

**Rick Osman** from Hertfordshire, UK, was Chairman of the recently disbanded 10¼" Gauge Railway Society and has transferred his membership to ASTT. He retired from a career in publishing, exhibition organising and marketing & design and has spent 20 years as vice-chairman of medical charity.

**Colin Hill** from Oxfordshire, UK, has transferred his membership of the 10¼" Gauge Railway Society to ASTT – Colin spent his career in electronics and much of his spare time on railway matters. In the 1970s he was involved in setting up the East Anglian Railway Museum and from 1995-2005 as team leader in restoration of the K1 Garratt loco n the WHR. From 2005 to present, he has owned and operated the 10¼" gauge Barn Well Hill Railway in Oxfordshire.

**Jordan Whitfield** from Uttoxeter, Staffordshire, UK, has also transferred his membership of the 10¼" Gauge Railway Society to ASTT. He is a Senior Design and Development Engineer at JCB, and a volunteer driver at Statfold Barn Railway. His father owns the 10¼" Whitfield Light Railway.

**Bill Fone** from Berkshire, UK, has also transferred his membership of the 10¼" Gauge Railway Society to ASTT.

**David Adams** from East Sussex, UK, has also transferred his membership of the 10¼" Gauge Railway Society to ASTT. Having retired from a career in banking, he's been Treasurer of the 10¼" Gauge Railway Society, having constructed and run his own 10¼" gauge garden railway at his previous home. Membership Numbers

### 10¼" Gauge Railway Society

Having received a generous donation from the disbanding 10¼" Gauge Railway Society, ASTT's committee has agreed to offer its past members 18 months of free membership of ASTT through to the end of 2027. So far, five of their members have confirmed their wish to transfer their membership to ASTT as listed above. A further invitation will be sent to the remaining five who have not yet responded.

## Graduated Student Member(s)

We are pleased to report that Gwion Clark, our student representative on our Committee, has graduated from Newcastle University with a degree of Master of Engineering with first class honours in mechanical engineering. I'm sure everyone will join me in congratulating Gwion.
Gwion has obtained a job at the Vale of Rheidol Railway, Aberystwyth, and will begin working there in August.
We hope that Gwion will stay on as an ex-officio member of the Committee so that ASTT can continue to benefit from his enthusiastic involvement in our affairs.

## Membership Numbers

Our membership now stands at 135, made up of 123 subscribing members and 11 non-subscribing student members.
3 past members have failed to re-subscribe and have been removed from the membership listing. Final reminders have sent to each of them.
All members are urged to pay their fees ***when they fall due on 1st January each year***. For information about renewing your subscription, please visit https://advanced-steam.org/membership-renewal/.

The current breakdown of our nominal 131 members is as follows (in the hope that all resubscribe!):

| | | | | | |
|---|---|---|---|---|---|
| Full Members: | 36 | UK Members: | 85 | Age Ranges | |
| Associate Members: | 88 | EU: | 21 | Over 60 | Approx. 41% |
| Student Members: | 11 | North America: | 16 | 30 to 60 | Approx. 47% |
| **Total Membership:** | 135 | South America: | 1 | Under 30 | Approx. 12% |
| *Suspended members* | *3* | Australasia: | 10 | Av. age | Approx. 58 |
| | | Asia & Africa: | 2 | Max Age | 97 |
| **Overseas members** | **50** | **= 37%** | | Min Age | 21 |

# ASTT ZOOM TALKS
# Chris Newman

We recently received a suggestion from Robin Gibbons, one of our members, that ASTT should offer members more education on steam loco "basics" to supplement the more advanced engineering themes that tend to feature in our conferences and Newsletters. For those who don't know him, Robin is the author and publisher of a magnificent and definitive series of five volumes detailing every type and class of steam locomotive that ever ran in China – a "must have" for anyone interested in Chinese steam – see https://www.tynedale-publishing.com/.

Anyway, Robin backed up his suggestion by offering us a presentation that he has already prepared and presented to another forum, on the subject of Walschaerts valve gear which should be of interest to all. However, having already filled the available speaking slots for our 2026 conference, offering it as a Zoom presentation seemed an obvious alternative, especially following the success of Alex Powell's recent Zoom broadcast under the auspices of I.Mech.E. – see http://advanced-steam.org/alex-powells-10-feb-2026-presentation-on-astt-and-the-revolution-project/.

Assuming that we're successful in hosting Robin's talk, we hope that it will become the "first of many", and that we will be able to arrange Zoom lectures on a reasonably frequent if not regular basis, offering them another means by which we might benefit our members. However, if we're to accomplish this, we'll need the involvement of members, not just to attend such talks but also to prepare and present them. We'd therefore like to hear back from members who would be interested and willing to offer presentations that we could broadcast over Zoom sometime in the future.

We'd also welcome suggestions as to "outside" experts who we might invite to talk on specialist subjects relating to their areas of expertise. Please contact us at info@advanced-steam.org if you would be interested in offering a Zoom talk that we might broadcast, or if you can suggest others who we might invite to give talk on subjects that might be of interest to members.

Meanwhile, we'll let you know if/when we have a date and time for Robin's talk.

# ASTT CONFERENCE 2026

## ASTT Annual Conference 3rd - 4th Oct 2026

to be held at the

## North York Moors Railway – Pickering and Grosmont

## Conference Update

**Introduction:** The Advanced Steam Traction Trust will hold its eleventh annual conference over the weekend of 3rd-4th Oct at North York Moors Railway in both Pickering and Grosmont, including visits to the NYMR's Grosmont Motive Power Depot and Pickering Carriage Works.

**Presentations:** The tight timetable limits us to offering only 6 speakers this year:

- **The NYMR's Paul Middleton** (aka 'Piglet') will update us on the conversion of the NYMR's S160 2-8-0 from coal to oil firing and operational experience. The engine will be in steam for us at the MPD.
- **Martin Johnson** will give a talk on firebox heat exchange.
- **Eelco de Bode** will talk on the use of pulverized coal in steam locos in the 20th century.
- **Owen Jordan** will talk on Fluid Dynamics and the Locomotive Exhaust.
- **Andrew Hartland** will give the fifth in his series of talks on **"Why BR Gave Up on Steam", this one being about Multiple Units**
- **Jamie Keyte and Richard Coleby** will talk about Revolution's boiler - the final stage in its build.

***In addition, Jamie is planning to host an after-dinner 'steam quiz' on the Saturday evening!***

**Meeting Rooms:** The presentations on Saturday will be in the NYMR Pickering Learning Centre and on Sunday in the NYMR's newly opened Grosmont Mutual Improvement Classroom (MIC).

We are planning a Saturday afternoon visit to the NYMR Pickering carriage and wagon workshops and a Sunday afternoon visit to Grosmont Motive Power Depot and Engine Sheds.

**Accommodation and Conference Dinner:** **The conference dinner will be held at the Best Western Forest & Vale Hotel, which** is an 8-minute walk from NYMR Pickering Station. The conference dinner will cost of £42 per head for a 3-course dinner with coffee in a private room.

Conference attendees are asked to make their own bookings with a hotel of their choice – see list of options on pages 3 & 4. Those who choose to stay at the Best Western Forest & Vale Hotel should notify the hotel that they will be attending the conference in order to obtain a price discount.

The Forest & Vale Hotel offers plentiful parking, and accommodation.

**Attendance Fees:** The hotel's dining room and the NYMR Pickering Learning Centre have a capacity for **30 attendees only**. Given the likely interest in the conference, we urge members (and non-members) to book early to secure a seat.

The Grosmont MIC has a larger capacity and we can accept more than 30 attendees for the Sunday.

In order to cover anticipated costs such as meeting room hire, morning and afternoon teas and coffees, lunch both days, we have set the attendance fee as follows:

- Conference fee for both days - £75
- Conference fee for one day - £38
- Conference fee for speakers - £38
- Conference dinner - £42

In addition, attendees will have to pay the cost of travel from Pickering to Grosmont and return on Sunday 4th October, either by driving themselves or by purchasing a return ticket from the NYMR for an anticipated £48.95 unless a discounted bulk-purchase price can be negotiated – see overleaf.

Those taking the train will need to catch the 9:30 from Pickering and return on the 15:50 from Grosmont.

Note (1): these two trains are scheduled to be operated by visiting engine 4079 'Pendennis Castle', which may attract a supplementary fare.

Note (2): If enough attendees are interested, we may be able to negotiate a discount.

Please let us know if you plan to take the train option as this may help us negotiate a discount with the NYMR.

**Please let us know as soon as possible whether you'd like to attend and your travel choice, so that we can finalise the conference arrangements.**

Chris Newman, Mike Stockbridge and John Hind
(Conference Planning Committee)

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## Conference Programme

| 2026 Conference Programme as at 14th July 2026 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Start** | ***Duration*** | **End** | | **Topic** | **Speaker** |
| **Saturday 3rd Oct '26** | **Pickering** | 09:30 | *00:30* | 10:00 | | Registration & Coffee (Pickering Learning Centre) | |
| | | 10:00 | *00:15* | 10:15 | | Welcome | John Hind |
| | | 10:15 | *01:00* | 11:15 | 1 | Pulverized coal as steam loco fuel 1910-1970 | Eelco de Bode |
| | | 11:15 | *01:00* | 12:15 | 2 | A fundamental approach to firebox heat exchange | Martin Johnson |
| | | 12:15 | *00:45* | 13:00 | | Buffet Lunch | |
| | | 13:00 | *01:00* | 14:00 | 3 | The Locomotive Exhaust – an Essay in Fluid Dynamics | Owen Jordan |
| | | 14:00 | *00:15* | 14:15 | | Travel to Pickering carriage works | |
| | | 14:15 | *01:00* | 15:15 | | Visit to Pickering Carriage Works | |
| | | 15:15 | *00:15* | 15:30 | | Travel to back to Pickering Learning Centre | |
| | | 15:30 | *00:15* | 15:45 | | Tea/coffee | |
| | | 15:45 | *01:00* | 16:45 | 4 | Why Did BR Give Up on Steam? Part 5 – Multiple Units | Andrew Hartland |
| | | 16:45 | *00:30* | 17:15 | 5 | Revolution - The Boiler | Jamie Keyte |
| | | 17:15 | *01:30* | 18:45 | | Free time | |
| | | 18:45 | *03:00* | 21:45 | | Conference Dinner | |
| | | | | | | | |
| **Sunday 4th Oct ' 26** | **Grosmont** | 09:00 | *00:15* | 09:15 | | Assembly in meeting room; registration of Sunday-only attendees | |
| | | 09:15 | *00:15* | 09:30 | | Meet up at Pickering Station (for those taking the train | |
| | | 09:30 | *01:00* | 10:30 | | Train from Pickering to Grosmont | |
| | | 10:30 | *00:30* | 11:00 | | Walk from Grosmont Station to MIT at Loco Workshop | |
| | | 11:00 | *00:30* | 11:30 | | Tea/coffee | |
| | | 11:30 | *01:00* | 12:30 | 6 | Oil Firing on the NYMR | Paul Middleton |
| | | 12:30 | *01:00* | 13:30 | | Buffet Lunch | |
| | | 13:30 | 01:00 | 14:30 | | Workshop Tour | Paul Middleton |
| | | 14:30 | *00:30* | 15:00 | | Tea/coffee | |
| | | 15:00 | *01:00* | 16:00 | | Train back to Pickering | |
| | | 16:00 | *00:15* | 16:15 | | Wrap Up | John Hind |

## Transportation options:

For international visitors: Pickering is located in north east England, some 240 miles from London

**By public transport:**

- By rail: London (Kings Cross) to Malton normally 2 to 3 hours with a change at York
- By rail: Newcastle to Malton normally 1.5 hours with a change at York
  then by bus: Coastliner bus takes around 20 mins from Malton to Pickering and the bus station at Malton is across the road from the railway station.
- By rail: Hartlepool – Grosmont, then change to the NYMR Grosmont to Pickering

**From airports**

- London Heathrow Airport (LHR): The UK's largest and busiest airport.
- London Gatwick Airport (LGW): Second busiest, serving numerous international destinations.
- London Stansted Airport (STN): Major hub for low-cost international carriers.
- London Luton Airport (LTN): Key airport for budget airlines.
- Manchester Airport (MAN): Primary international gateway for the North of England.
- Edinburgh Airport (EDI): Scotland's busiest airport.
- Newcastle International Airport (NCL): Main airport for the North East.
- Liverpool John Lennon Airport (LPL): Major airport in the North West.

## Accommodation options:

**Best Western Forest and Vale Hotel,** Malton Road, Pickering. YO18 7DL, Phone: 01751 472722
Website: www.bw-forestandvalehotel.co.uk Email: info@forestandvalehotel.co.uk

**Note: This hotel will be hosting our conference dinner on 3rd October. It also offers special room rates to ASTT conference delegates as follows:**

**1 night stay Saturday – maximum 8 rooms**

- **Standard Room @ £180**
- **Executive Room @ £200**
- **Superior Room @ £220**
- **Deluxe Room @ £240**

**Add Friday and / or Sunday night for the following per night price**

- **Standard Room @ £160**
- **Executive Room @ £180**
- **Superior Room @ £200**
- **Deluxe Room @ £220**

Prices are per room and inclusive of **full English breakfast.**
For single occupancy reduce the rate by **£20 per night.** Maximum 4 single rooms.

To make a provisional booking, the hotel can hold rooms for 21 days. To confirm a booking, a **non-refundable** deposit of £50 per room must be paid, with the balance payable on departure.

To avoid further charges cancellation must be given to the hotel by the **28 days prior to arrival.**

The hotel describes its rooms as follows:

**Standard**

**Cottage wing (steep stairs)**

| | |
|---|---|
| Ground floor (shower over bath) | x 1 Room 19 |
| 1st floor small double (shower only) | x 1 Room 21 |
| 1st floor double room (shower over bath) | x 1 Room 20 |
| 2nd floor double room (shower over bath) | x 2 Rooms 22 23 |

**Standard doubles: (4 ft 6 beds)**
**Garden wing (ground floor)** — **x 4 Room 15, 16, 17, 18**
2 x overlooking garden
shower over bath

**Standard twin: (3 ft beds)**
Main house ( shower only) — **x 1 Room 5**
overlooking garden
noisy fan during food service

**Executive doubles: 5ft**
**Main house (shower over bath)** — **x 2 Rooms 7 and 9**

**Executive Twin**
**Main house (shower over bath)** — **x 1 Room 8**

**Superior Double 5ft and 6ft beds)**
**Contemporary rooms**
1st floor garden wing (shower over bath) — **x 2 Room 11,14**
all overlook garden

**Superior Twin**
**Contemporary rooms**
1st floor garden wing (shower over bath) — **x 1 Room 12**
all overlook garden

**Superior Double 5ft and 6ft beds)**
**Traditional superior doubles**
1st floor main house (shower over bath)
1 x overlooks garden — **x 1 Room 6**
1 x front facing — **x 1 Room 4**

**Superior Twin**
**Traditional superior twin**
1 x front facing — **x 1 Room 3**
1 x overlooks garden — **x 1 Room 1**

**Deluxe Double 5ft four poster bed**
**Traditional four poster ( no curtains) double** — **x 1 Room 2**
1st floor main house (shower over bath)

**Deluxe Double 6ft four poster bed**
**Contemporary four poster ( no curtains) double** — **x 1 Room 10**
1st floor garden wing (shower over bath)

**PLEASE NOTE: THE HOTEL IS GRADE 2 LISTED AND DOES NOT HAVE A LIFT**

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## Alternative Accommodation Options

**The White Swan Inn,** Market Pl, Pickering YO18 7AA, Phone: 01751 472288
Website: www.white-swan.co.uk Email: welcome@white-swan.co.uk
The White Swan Inn is a 16th century coaching inn which has been transformed into a luxurious hotel and restaurant.

**The Black Swan Coaching Inn,** 18 Birdgate, Pickering YO18 7AL, Phone: 01751 798209
Website: www.blackswan-pickering.co.uk Email: admin@blackswan-pickering.co.uk.

**The Old Manse Pickering,** 19 Middleton Rd, Pickering YO18 8AL, Phone: 01751 476484
Website: www.oldmansepickering.co.uk

**Premier inn,** Thornton Rd, Pickering YO18 7HZ Phone: 0333 003 8101
Website: www.premierinn.com

Several other B&B in and near Pickering. See: www.Booking.com, www.Hotels.com, www.Airbnb.com.

# Conference Dinner Menu

## Starters:

Leek and potato soup with crusty bread

Traditional prawn cocktail

Twice baked blue cheese soufflé on a parsley and garlic cream sauce

Loin of pork with an apple & calvados sauce

Chargrilled breast of chicken with a peppercorn sauce

Grilled fillet of salmon with a hollandaise sauce

Mushroom and stilton wellington with a wholegrain mustard sauce

*Served with roast and new potatoes and mixed seasonal vegetables*

## Sweets

Lemon cheesecake with raspberry coulis

Treacle tart with creamy custard

Yorkshire blue and Fountains gold cheddar with biscuits,

celery, grapes and chutney

## Teas & Coffees

Tea / coffee and mints

**Attendees are asked to submit their meal selections when booking their place at the conference. They are also requested to indicate if they have any food or other allergies.**

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# Payment Arrangements

Please secure yourself a place at this conference by making early payment of conference fee and dinner cost, either by:

- BACS to ASTS's Barclays bank account (Sort Code 20-73-26, Account No. 53896625 - IBAN GB46 BUKB 2073 2653 8966 25), or
- via PayPal (paid to info@advanced-steam.org), or
- by cheque made out to "Advanced Steam Services Ltd" and posted to Chris Newman at Flat 4, 2 Kimmerghame View, Edinburgh EH4 2GP

# PUBLICATIONS PAGE
# Chris Newman

## Book Sales

It is sad to report that Adam Harris is retiring and that his book business, Camden Miniature Steam Services, will be undergoing some form of metamorphosis (undisclosed at the time of writing). In recent years, Camden has handled some 25% of ASTT's book sales, so it is to be hoped that in its changed form, Camden will continue to sell ASTT's books. Books sales since Newsletter 29 (March 2026) have been as follows:

| Publisher | Author | Title | Sales since N/L 29 | Total Sales |
|---|---|---|---|---|
| ASTT | L.D. Porta | Porta's Papers Vol 1 | 5 | 167 |
| | L.D. Porta | Porta's Papers Vol 2 | 2 | 155 |
| | L.D. Porta | Porta's Papers Vol 3 | 5 | 125 |
| | Martyn Bane | Porta's Papers Vol 4 | 9 | 104 |
| | L.D. Porta | Porta's Papers Vol 5 | 17 | 83 |
| | C. Newman (Editor) | Porta's Centenary Compendium Vol 1 | 1 | 93 |
| | C. Newman (Editor) | Porta's Centenary Compendium Vol 2 | 2 | 60 |
| | Ian Gaylor | Lyn Design Calculations | 1 | 114 |
| | David Wardale | 5AT FDCs | 4 | 230 |
| | David Wardale | Reminiscences of a Trainspotter | 1 | 46 |
| | Alan Fozard | 5AT Feasibility Study | 2 | 49 |
| | Chris Newman | An Indonesian Steam Odyssey | 0 | 0 |
| | Chris Newman | ASTT Prospectus¶ | 1 | 95 |
| Camden* | *David Wardale* | *The Red Devil and Other Tales from the Age of Steam* | *0* | *260* |
| | *Phil Girdlestone* | *Here be Dragons* | *0* | *33* |
| | *Jos Koopmans* | *The Fire Burns Better …* | *0* | *11* |
| | *L.D. Porta* | *Advanced Steam Design* | *0* | *5* |
| Crimson Lake | Adrian Tester | Physiology of the Loco Boiler – Part 1 | 1 | 42 |
| | Adrian Tester | A Defence of the MR/LMS 4F 0-6-0 | 0 | 44 |
| | Adrian Tester | Introduction to Large Lap Valves | 0 | 24 |
| | | Total sales | 50 | 1743 |

* Camden is now selling these titles in digital format and are no longer sold by ASTT.

¶ ASTT's "Prospectus" was produced for distribution at the Greatest Gathering event in Derby (August 2025). It is however available for sale "at cost" for £2 per copy + postage.

Book sales provide a valuable source of income to ASTT which helps to fund activities, not least our *Revolution* project. M**embers are offered 20% discount on our in-house titles and are urged to support our endeavours by purchasing books from us.**

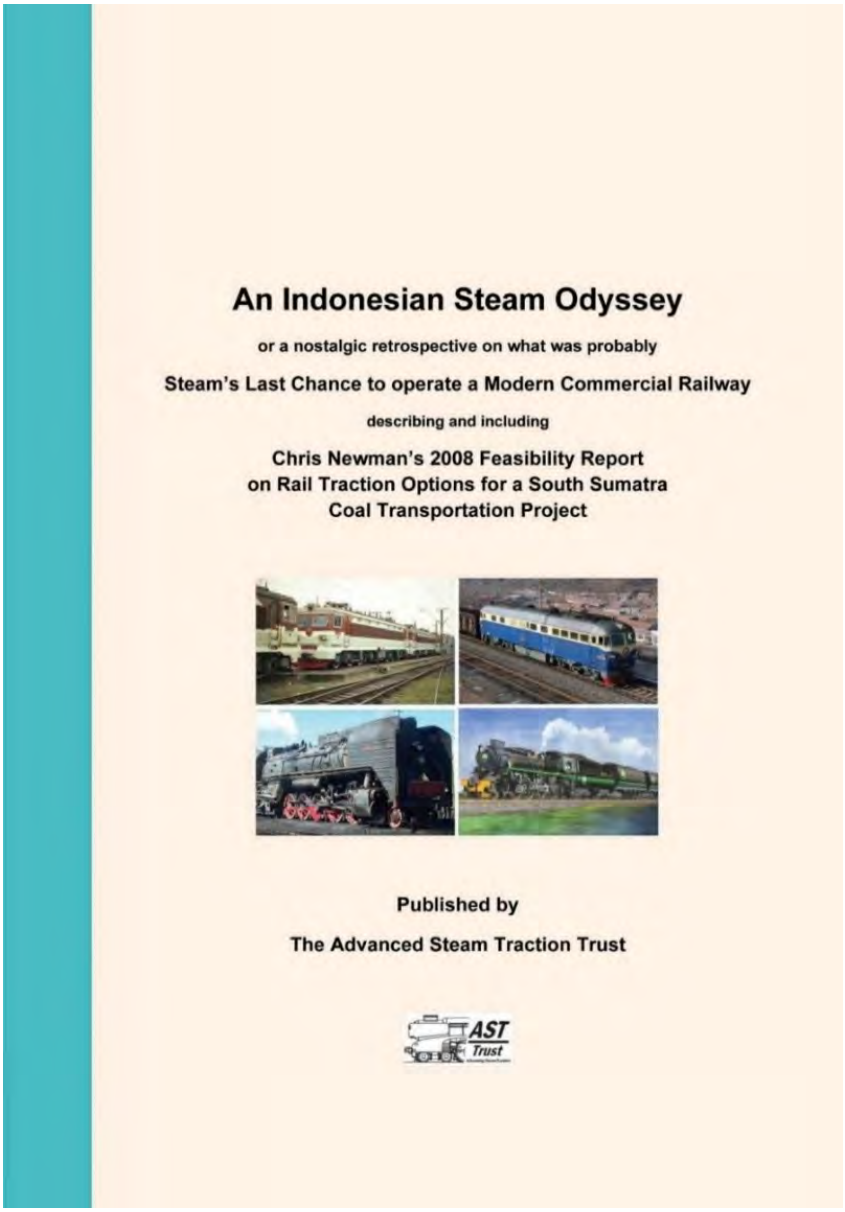
**Note:** We'd like to expand our book selection, so we welcome any suggestions for additional titles that we might be able to sell, or new texts that we might publish under ASTT's logo.

# New Publications

## An Indonesian Steam Odyssey by Chris Newman

186 pages - £22.00* plus Postage & Packaging

** members' 20% discount applies*




At our 2026 AGM, our chairman, John Hind, appealed to members to think about offering book titles that ASTT might publish. He noted that profits from our book sales are only maintained when we have new titles to offer.

His words inspired me to dig out a Feasibility Study that I undertook almost 20 years ago, in which I attempted to justify (successfully, I believe) the adoption of steam traction on a proposed new coal transportation railway on South Sumatra in Indonesia.

I've appended to my report a 30-page introduction which includes a background commentary on my role and a few retrospective observations and criticisms of what I'd written in my Feasibility Report.

I offer the book to buyers with some trepidation because it's the first railway book that I've published that reveals anything about myself or my activities in the railway arena – in which I make no claim to great expertise.

I've given the book the rather whimsical title "An Indonesian Steam Odyssey" which I explain on the back cover as follows:

## An Indonesian Odyssey - or Indonesian Fantasy?

In December 2003, the author, Chris Newman, received an email out of the blue, enquiring whether he would be able to supply a fleet of steam locomotives to operate a planned coal haulage railway in Indonesia.

Chris was living and working as a self-employed engineer in China at the time. Two years earlier, he had become involved in establishing 5AT Project for which he acted as webmaster and primary contact person. It was the 5AT website that sparked the interest of the Indonesians and through which their enquiry was sent.

The 5AT Project aimed to build a high-performance express passenger locomotive that would be capable of hauling 400 tonne trains at a continuous 100 mph on level track. This, of course, would have been quite unsuitable for coal haulage, but Chris had been involved in conceptualising a design for a freight-haulage version of the 5AT, dubbed the "8AT". He was also aware that China was in the process of replacing its vast fleet of steam locomotives with diesel traction, and that reconditioned Chinese QJ 2-10-2 locomotives might be a viable option for operating the Indonesian railway until such time as a fleet of 8AT or other modern steam locomotives could be designed and built to take over the railway's operation.

David Wardale, of "Red Devil" fame and "father" of the 5AT Project, had recently returned to the UK after 12 years working and living in China. David put Chris in contact with a Chinese railway engineer named Wang Li Jie, who in turn, put him in touch with a Mr Yu, manager of a locomotive repair shop in Mudanjiang, in the far northeast of China. With locomotive performance data provided by Wang Li Jie and cost estimates provided by Mr. Yu, Chris was able to put together a comprehensive Feasibility Study that compared steam, diesel and electric traction options for the planned coal railway. In so doing, he demonstrated that the overall cost of steam would have been significantly lower than that for diesel or electric traction.

The introductory section of this book outlines the background to Chris's "Indonesian Odessey". The bulk of the book comprises the Feasibility Study itself. Some readers may dismiss the study as an "Indonesian Fantasy" - as it eventually became - but for a brief period, the opportunity for steam seemed very real. However, in 2008 the window of opportunity effectively closed when the last of China's QJ locomotives were scrapped. At the same time, the Great Financial Crash eliminated any possibility of raising finance for the project, thus ending what was probably the last opportunity for steam traction to play a part in the modern commercial world.

I hope it will be of sufficient interest to members and others to generate enough sales to cover the cost of setting it up on Bookvault and for the proof copies that I've purchased.

Please write to me at info@advanced-steam.org if you'd like to purchase a copy. As usual, all proceeds go to ASTT.

**I also urge members to give some thought creating titles of their own that ASTT might publish in the future. Our members have such a huge wealth of knowledge and experience, some of which must surely deserve preserving for posterity!**

# Titles published by the Advanced Steam Traction Trust

| | Year | Author | Title | Pages | RRP* |
|---|---|---|---|---|---|
|  | 2015 | David Wardale | The 5AT Fundamental Design Calculations | 556 (b&w) | £49.00 |
|  | 2016 | Alan Fozard and others | The 5AT Feasibility Study edited | 230 (colour) | £35.00 |
|  | 2018 | Ian Gaylor | Steam Locomotive Design Specifications and Calculations for New Build Baldwin 2-4-2T 'LYN' | 604 (colour) | £52.00 |
|  | 2018 | L.D. Porta transcribed and edited by Chris Newman | Selection of Papers by L.D. Porta – Vol 1 - Tribology and Lubrication | 250 (b&w) | £25.00 |
|  | 2019 | L.D. Porta transcribed and edited by Chris Newman | Selection of Papers by L.D. Porta – Vol 2 - Adhesion, Compounding and the Tornado Proposal | 256 (b&w) | £25.00 |
|  | 2021 | L.D. Porta transcribed and edited by Chris Newman | Selection of Papers by L.D. Porta – Vol 3 - - Steam Locomotive Boilers, Fireboxes and Combustion | 290 (b&w) | £25.00 |
|  | 2024 | L.D. Porta and others Compiled by Martyn Bane | Selection of Papers by L.D. Porta - Vol 4 - Locomotive Boiler Water – Treatment, Circulation and Preheating | 513 (colour) | £40.00 (£48 hard cover) |
|  | 2025 | L.D. Porta transcribed and edited by Chris Newman | Selection of Papers by L.D. Porta – Vol 5 - - Exhaust Systems and Other Aspects of Loco Design, Performance and Operation | 340 (some colour) | £27.00 |
|  | 2022 | Compiled and edited by Chris Newman | A Compendium of Articles and Papers to celebrate the Centenary of the birth of Livio Dante Porta - Volume 1 | 226 (colour) | £25.00 |
|  | 2023 | Compiled and edited by Chris Newman | A Compendium of Articles and Papers to celebrate the Centenary of the birth of Livio Dante Porta – Volume 2 | 331 (colour) | £27.00 |
|  | 2023 | David Wardale | Reminiscences of a Trainspotter | 67 (b&w) | £16.00 |
|  | 2025 | Chris Newman | ASTT 2025 Prospectus | 22 (colour) | £2.00 (at cost) |
|  | 2026 | Chris Newman | An Indonesian Steam Odyssey | 186 | £22.00 |

* The RRPs (recommended retail prices) shown do not include postage. Paid-up members of ASTT are entitled to a 20% discount on these prices. These books can be purchased through ASTT's website at http://advanced-steam.org/books-forsale/.

## Porta's Papers Volume 5—Corrections

The following email was received from Hans-Udo Drees:

I am having great pleasure in reading your fifth volume of Portas fascinating papers on steam technology.

However, for the sake of history I would like to comment on some of your footnotes:

1. *Page 65, Nr. 7: **Bauer-Wach system**. You probably did not find any useful information when using the Porta spelling "Bauer-Bach" system. The correct spelling is Bauer-Wach, which was mainly the retrofitting of triple-expansion engined steam ships with an exhaust turbine coupled to the reciprocating engine with a Föttinger fluid coupling (see attached PDF starting with page 12, my translation, LES means Lentz Einheits-Schiffsmaschine). A similar system of combining a reciprocating steam engine with an exhaust turbine and condensation was tried on rebuilt German 4-6-0 T38 2255 with disappointing results. In this case the exhaust turbine was not directly coupled with the locomotive engine but drove the tender.*
2. *Page 255, Nr. 9: Portas spelling of "Alsthom" (drive) was correct at the time of writing (1977). **Alstom** S.A. (formerly **GEC Alsthom** until 1998), headquartered in Saint-Ouen-sur-Seine, is a French publicly traded corporation. **Alstom** was formed in 1928 through the merger of SACM (Societé Alsacienne de Constructions Mechaniques, Graffenstaden, France) and Thomson-Houston (Compagnie Française Thomson-Houston (CFTH), Paris, France as **Alsthom**.*

The corrected pages follow:

Since it is thought possible to keep to the Stephensonian boiler up to 60 atm pressure[6], this, coupled with a steam temperature of 550ºC and condensing below atmospheric pressure, a test thermal efficiency of 23%, and even more in cold weather, is thought possible. Such condensing is possible thanks to the now-available high-capacity heat-transfer compact surfaces.

The main reciprocating engine continues to be adhered to, but a tail turbine is disposed on the low-pressure side working draft and cooling fans, the extra work available being transferred to the wheels on the Bauer-Wach system[7] or simply compressing HP exhaust steam. However, unlike the formerly described progress, this one requires an extensive research program involving perhaps 10-years work and more than $10m expenditure. This scheme is called "Third Generation Steam".

Counterpressure braking devices have also been thought of to improve the old Riggenbach braking[8] without the nuisance of foreign matter sent to the cylinders thereby spoiling lubrication. This is thought to be equivalent to dynamic braking.

The all-year thermal efficiency, relating the fuel bill to brute drawbar mechanical work has been stressed as the key point. Test efficiency figures are thought necessary, yet second in importance. While this goes against steam, it opens a virgin field for effective progress, this depending very little on sophisticated engineering. What to do so that optimum test efficiency figures can be repeated day after day, minute after minute on one, ten, hundred engines? An airtight damper is worth a 50-psi increase in boiler pressure!

Three-cylinder compound arrangement has been so disposed that the L.H. cylinder is the HP one. This makes a neat front-end somewhat resembling an automobile engine block with no leaking steam pipes, hidden valves, etc. But what is most important is that it naturally leads to the simple-compound arrangement which is thought to be an elegant answer to the problem of providing a wide speed range on which full boiler power can be used even in dragging service.[9]

So far, the list can continue showing a wide spectrum of new ideas on a field which both steam and opponent engines are considered a "closed book".

Four big steps are believed to be apparent:

(i) The incorporation of a larger share of basic engineering yet waiting for further work.

(ii) A large working field has been observed waiting for progress: the gap between test efficiency and the all-year-round one.

(iii) Progress on steam cylinder tribology opens a door to hitherto unthought high pressure, high temperature conditions.[10] High performance compact heat exchanger technology (now available) contributes to opening the door to very high thermal efficiencies which are to be sought when energy becomes 10 times generally more expensive than it is today.

(iv) Oil fuel is no longer necessary for any high performance on rails, but sun energy through photosynthesis is within easy reach.[11]

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[6] Porta's 1976 paper "Notes on the Flat Plate Stayed Firebox Construction for Locomotive Boilers working at 30 and 60 atm. Steam Pressure" can be found in Volume 3 of this book series. *[Editor]*

[7] The Bauer-Wach system was an exhaust steam turbine system used in marine engines for increasing power output. It was originated by Sir Charles Parsons See Grace's Guide to Briskish Industrial History. *[Editor]*

[8] Named after Niklaus Riggenbach (1817 – 1899), a Swiss mechanic, railway engineer, politician and inventor of the rack railway system as well as the counter-pressure brake. *[Editor]*

[9] The "three-cylinder compound arrangement has been so disposed that the L.H. cylinder is the HP one" is described in more detail in Porta's 1976 paper: "A New Conception of the Compound Locomotive" published in this volume. *[Editor]*

[10] Porta's 1975 and 1995 papers on Cylinder Tribology can be found in Volume 1 of this series. *[Editor]*

[11] Someone – John Click, perhaps - has drawn a large green question mark against this paragraph on the photocopy of the manuscript! *[Editor]*

series, do not require a special transmission linkage (for example Alsthom Drive[9]) because it goes as a simple nose-suspended unit. But its efficiency can be expected to be somewhat lower which is not too important in view of the non-ordinary use.

e) **It allows a reduction in the otherwise not fully utilized adhesion weight of the Porta's simple-compound engine**, thereby reducing the amount of water ballast to be put on the engine.[10] When circumstances require working in simple expansion, hence above adhesion possibilities, part of the power is sent to idle axles via the hydraulic drive, hence the design of the main engine is simplified.

## 3 CONCLUSIONS

Gear pump technology is a well-developed one and has no secrets. The application originating the present scheme is able to be satisfied with mild requirements involving no special workmanship, tolerances, materials, etc, while even if a partial success is obtained, a sensible improvement results as compared to leaving the situation as it was until now: both engines of a Mallet remaining uncoupled. Very little maintenance can be expected.

The gear-pump solution does not affect an engine's curve-negotiation, hammer blow, axle disposition etc. Nor does it put extra strains on the coupling rods. It can be accommodated within the restricted space available, and it imposes very little constraint on frame design.[11]

Being totally enclosed, no influence of the hostile locomotive environment can be expected; derailment damage on the robust pump body can be expected to be irrelevant; extra weight is very small and even inside cylinder engines can be provided.

The setting up of the pump units does not require any special lining up of the frame. If necessary, the force transmitting ability can be increased by enlargement[12], although it seems that a small unit can transmit more than what is apparently required.

The Mallet locomotive can be conceived as classically or the Porta's short-boilered front power tender version designed as an independent locomotive receiving steam power from the hind unit – everything enlarging the spectrum of possibilities of the steam locomotive.

The discussion is stopped here pending further developments.

## 4 REFERENCES

1 – BEACHAM, T.E. "High Pressure Gear Pumps". Procedures I.Mech.E 155, 417-452 (1946)

[9] Portas spelling of "Alsthom" (drive) was correct at the time of writing (1977). *[Dipl.-Ing. Hans-Udo Drees]*

[10] Porta's "simple-compound" engine is described in his paper titled "A New Conception of the Compound Locomotive" published in this volume. *[Editor]*

[11] Unusually, Porta's manuscript is almost unintelligible here. The opening sentence of the paragraph is written as follows: "The solution do not conditions curving, hammer blow, axle disposition etc on any engine; do not put extra strains on the coupling rods, can be accommodated within the restricted space available and impose very little conditioning to frame design". *[Editor]*

[12] The manuscript has "...the force transmitting ability can be increased by large, although it seems ...". *[Editor]*

# REVOLUTION UPDATE
## Jamie Keyte

**Open Days**

"Revolution" was exhibited at the "Clan" project open day, hosted by Diamond Group, on 11 April in Sheffield. This was the first outing for "Revolution" on the trailer so it was with some relief that it (and the trailer) arrived unscathed after a dash up the M1. It was a good opportunity to prove that the loco can be safely transported, loaded and moved with minimal labour. At the Open Day there was a good level of attendance and "Revolution" received its fair share of interest against the backdrop of "Hengist" and the B17 "Spirit of Sandringham".



*Richard Coleby – Chief Salesman at the "Hengist" open day.*

A second – much smaller – event was held at Keyte Smith Ltd's premises on 16th May where the new build LNWR George V Class 4-4-0, No. 2013 "Prince George" was on display for it's members, as was "Revolution". It was a great pleasure to have Wolf Fengler visit us for the event. It is pleasing that some of the design philosophies employed on "Revolution" (e.g. fabricated main frames and cylinders) have parallels on the new build Pennsylvania T1 which is making fantastic progress in the US.

Lastly, the trailer was pressed into action once again for the Stapleford Miniature Railway event on 13/14th June. Sadly, the railway wasn't operating during the weekend due to track upgrades being made in preparation for the IMechE Railway Challenge. However, we did display "Revolution" alongside some very impressive stablemates. Whilst at Stapleford opportunity was taken to check the clearances and operation of the tender drawbar. Until this point the tender hadn't run at all and a couple of minor issues came to light – more of this below.



*"Revolution" at Stapleford alongside the awesome Niagara*

**Tender Trials**

The purpose of the trials was to confirm the tender drawgear and running gear was working correctly. Hitherto the tender had not run more than a few feet on the show stands. The loco and tender were coupled together and slowly propelled around various bits of track by the Stapleford diesel, including the tight radius approach to the new turntable. The drawbar clearances were all found to be satisfactory during this exercise. However, on the approach to the shed for stabling overnight, one of the tender bogies derailed. Fortunately, the speed was low and no damage was done, but a fair bit of head scratching ensued!

The issue turned out to be a combination of three things:

Firstly, the tender suspension was thought to be a bit hard with insufficient compliance to cope with track twist.

Secondly, there was some spring element tolerance variation leading to unequal wheel loading.

Thirdly it was found that the bogie bolster support pads had a higher level of friction than was desirable and this was impeding bogie rotation at track curvature transitions.

Fortunately, all of these issues were readily dealt with. To start with the spring elements were made from 30 Deg Shore A silicone sheet (the softest commercially available from stock) which was then cut by hand to the desired shape. The hand cutting process had resulted in some spring elements being oversize. The main springs on the loco are made from 70 Deg Shore A material which is hard enough to machine to size, so these are more consistent. The tender springs are too soft to machine (not for lack of trying!).

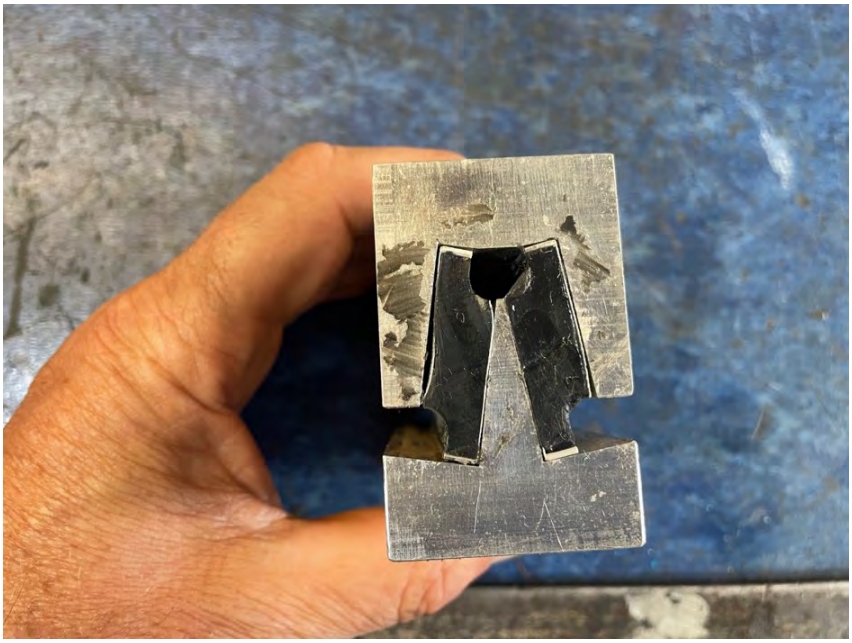
To address the problems it was decided to take a fresh approach to manufacture of the spring elements. Using the miracle of 3D printing some moulds were made, which dealt with the question of maintaining accuracy. Then a softer silicone material (actually an adhesive sealant) with a hardness of 23 Deg Shore A was selected. There was a period of trial and error as the best approach to getting the elements out of the moulds was "discovered" since one of the key properties of an adhesive is it's tendency to stick! The solution turned out to be a 3D printed spring backer which was inserted into the mould prior to the addition of the silicone, forming a barrier between it and the mould. The backer then stayed permanently attached to the spring element.



*Two halves of the mould primed with silicone rubber. The backers are already in place under the silicone. The two halves were dowelled together, squeezed in a vice and left to cure.*



*Two completed spring elements with backers (light grey) in place*



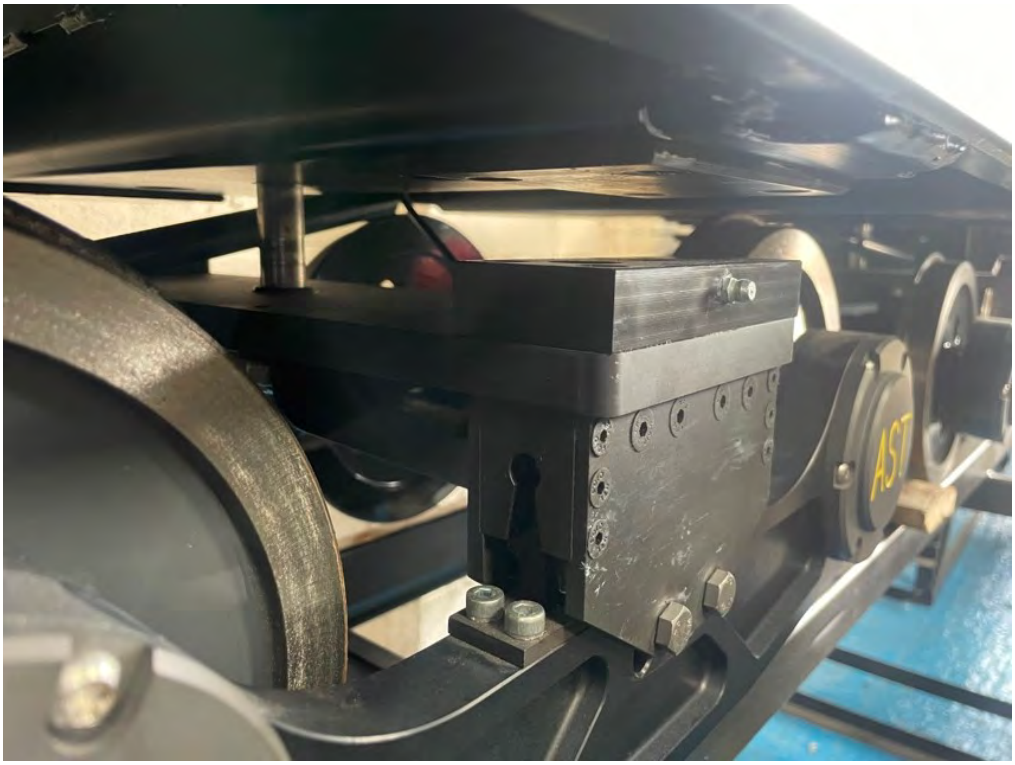
*Two spring elements fitted into the test housing.*

Once the bugs were ironed out of the manufacturing process, spring elements can be produced quite simply and cheaply. It takes about ten minutes to make a pair of spring elements – plus a few days curing time – and the material cost is around £6 per pair including the 3D printed backing pieces.

The wear pads transfer the weight of the tender into the bogie bolsters. These comprise a steel plate resting on an Acetal Copolymer block and it was originally intended that these would run dry.

It is worth noting that on full size bogies some form of yaw damping is necessary to prevent them "hunting" at higher speeds. On older stock this was done by friction pads in the bolster supports. On more modern stock with air springs it is done with hydraulic yaw dampers. On reflection, it is unlikely "Revolution" will go fast enough for "hunting" to be a problem, whereas the ability to safely negotiate curves is definitely a priority!

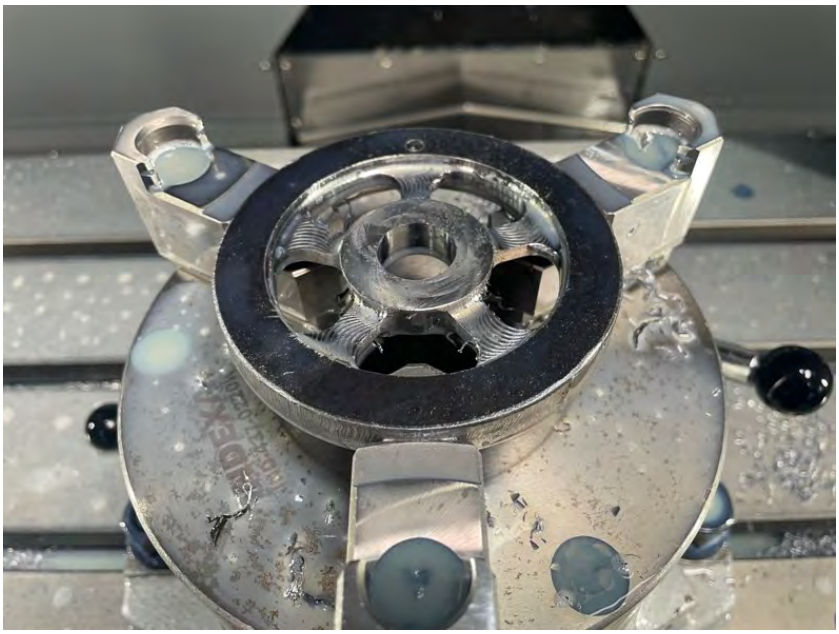
It was found that the Tufftride finish on the steel plates had a matt surface which had quite high level of friction. This was dealt with by giving them a polish. In addition the Acetal Copolymer blocks were fitted with grease nipples to provide a bit of lubrication if required.




*Tender jacked up to show spring with new elements, grease nipple fitted to the Acetal Copolymer bearing block and polished steel wear pad above.*

## Valve Gear

Whilst all this was going on, attention has turned to the set up of the valve gear. The first task was to finish off the reverser mechanism with a wheel / handle and dog clutch to hold it at the desired cut-off.



*Reverser hand wheel machined from solid*



*Finished hand wheel, fixed clutch plate and sliding dog.*

The sliding dog is screwed to the handwheel and slides towards the driver on the reverser shaft, against a light spring pressure. Rotary motion is imparted to the reverser shaft by a sliding keyway. Rather typically, quotes from various suppliers to put the 3mm keyway in the sliding dog were rather excessive for what is essentially a 10 minute job. So, for a fraction of the cost a broach was purchased, a broaching bush was made and the job was completed in-house.

Next came the return crank pins which – for some reason – hadn't yet been done. These were then pressed into the return cranks with a spot of weld on the back to ensure they couldn't come adrift.



*Return crank fitted with crank pin*

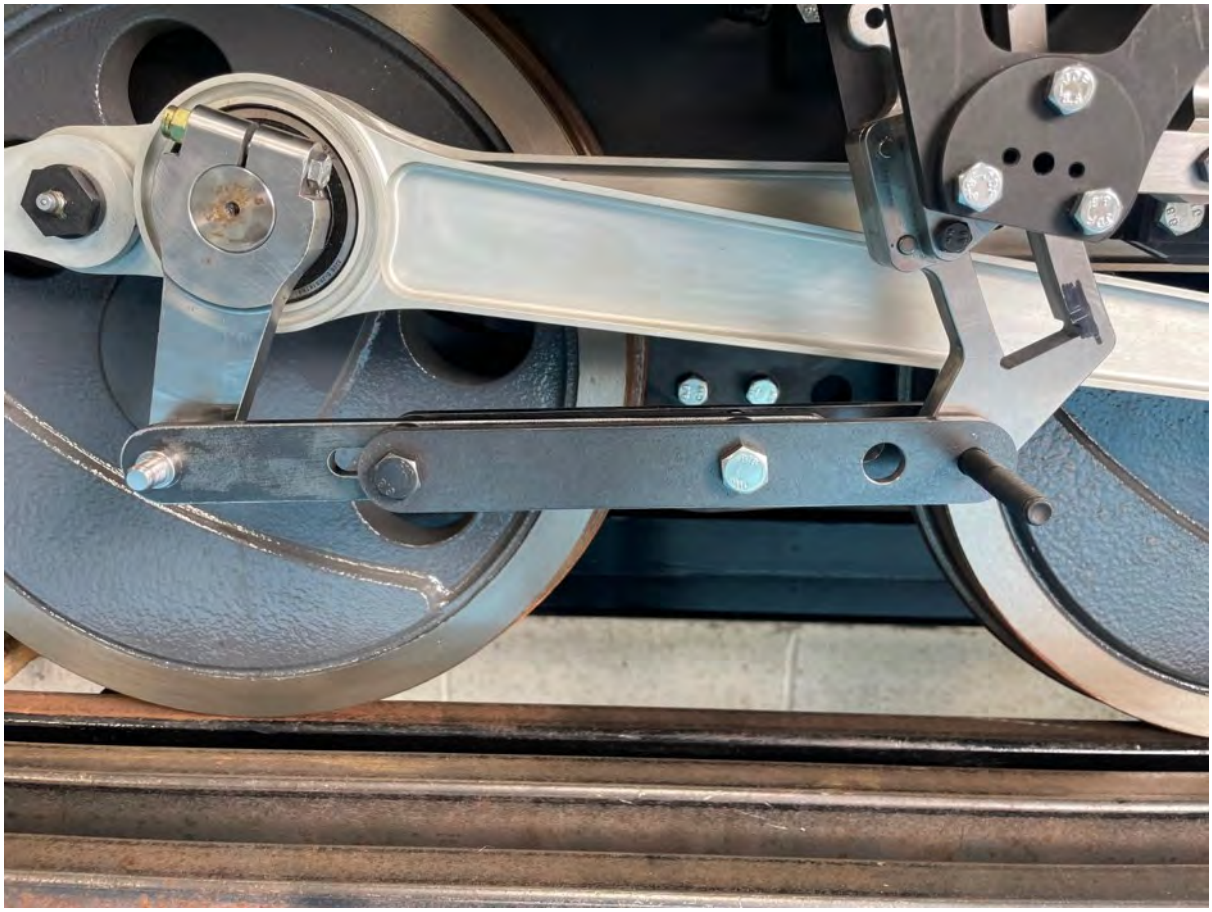
Next came the job of setting the return cracks in the correct position. As “Revolution” is outside admission the return cranks lead the main crank pins by 90° and must be positioned at exactly the correct radius. Here we benefitted from another feature of the design: The driving axles have an extended 5mm / M6 hole extending inwards from the turning centres in the end of the axles. These were incorporated to allow a temporary grease nipple to be fitted for charging the axle bearings with lubricant. With the aid of a “special bolt”, they also provided a means of extending axle centreline outwards to the return crank, allowing a simple plate jig – referencing the main crank pin and the axle centres – to position the return crank. Once the valve gear set up is finalised a dowel pin will be inserted to permit the return cranks to be removed and replaced accurately.



*Return Crank setting with the jig.*

Next stage is to confirm the length of the eccentric rods. In theory “Revolution” should be accurate enough that these could be made straight off the drawing board, but sometimes the adage “Measure Twice, Cut Once” is preferable to the “Measure Twice, Cut Thrice” philosophy!

Assuming all is correct, with the driving crank pin at either Back Dead Centre or Forward Dead Centre, the expansion link should be vertical and moving the reverser from full forward to full reverse gear should produce zero movement at the top of the combination lever. To assist in this an adjustable eccentric rod jig has been made. Once the eccentric rod length has been determined correctly from the locomotive then it can be measured and the eccentric rods made to suit.



*Eccentric rod jig*

## Cylinder Assembly

With the various open days out of the way, Richard Coleby has taken custody of the cylinders and is now in the process of building them up with the seals, liners, valves and valve drive mechanism. There are still a couple of bits and pieces required to complete; the material for the pistons and piston rods is now in hand for CFE to finish. The bronze for the piston rod gland nuts is also ready for machining.

## Boiler

The boiler is getting closer to reality. The boiler design and drawings are complete thanks to some hard work by Richard. The biggest obstacle has been finding an independent third party to check compliance with the pressure vessel regulations. Thankfully we have now identified a route through this process and have been approaching potential builders for prices for the physical construction. Watch this space!

## Completing the Job

We can now reasonably claim we can see the light at the end of the tunnel, even though it is still some way off! However, there is still much to be done with a myriad of smaller components still needing to be made, along with some bigger bits.

Detailing of the cab is also making steady progress with some of the material ordered and the main laser profiles expected soon. The finalisation of the foot plating should follow soon thereafter.

There are still some smaller “stand alone” items to be made (e.g. the smokebox door furniture) so if there are any model engineers out there with a few spare afternoons then please do not hesitate to get in touch!

# IN MEMORIAM DOUG LANDAU

## David Pawson

Members will be saddened to learn that our member Doug Landau died in early March, aged 89. He had been in decline for some time. He called me to say farewell just before Christmas, very touching.

He was a career engineer and worked for a number of major British enterprises, finishing up as an analyst at LIFFE. He loved matters engineering, and was a big fan of British engineering achievements, for example the Merlin engine. He was present at the 1952 Farnborough Airshow disaster, which may have stunted his interest in aircraft.

He will be best remembered in these circles for his work in analysing the performance of steam powered trains, and on BR Test Bulletins to establish what steam power could and could not do.

Many of us enjoyed his privately circulated Newsletters from 1992-2017 on preserved steam performance, which also featured analysis of outstanding runs from the past. This was all based on careful research into the resistance of both coaches and locomotives, and on both the road and stationary plant test results at Rugby and Swindon. His engineering background made him the ideal person to tackle the often confused data on train resistances. Importantly, he knew first hand many of the people who had been involved in these tests, so he knew their weaknesses as well as strengths. 'Don't try to make sense of the BR Test Bulletins', he advised me, 'you'll finish up in an asylum'. Thanks to his work we have a much clearer idea of what is and is not possible with steam traction.

He read a paper to the RPS ca.1998 entitled 'How Many Horsepower?' which laid out his thinking on resistance matters. This forms the basis of some RPS recommended resistance equations. I owe a personal debt of gratitude to him, since it was he who provided the basis for my own thinking on these matters. A follow up talk in 2012 'From Shovels to CT' was a similarly historically informed, thorough, logical and dispassionate review of how the energy consumption was measured on the railway.

Over time I believe I improved his understanding of locomotive resistance to a significant degree, which meant that his estimates of locomotive power should often be somewhat reduced. He never fully acknowledged this, for which I am grateful, requiring my thinking to be sound, sharp and clear. And, in any case, and he would stand by his conclusion in 'How Many Horsepower' that given innumerable possible errors, power estimates were always at best in the 'sensible' category not the 'precise' one.

I attended his funeral in Watford on March 19th which celebrated his achievements in these fields as well as his playing of New Orleans Jazz, and love of angling. He was actively engaged in a wide number of different circles. His eulogy revealed an emotional side not normally seen. He was a man who enjoyed taking contrary positions to the establishment, and relished the cut and thrust of the ensuing debate, not to win the argument, but to find out what was really going on. He was scathing about the way the economics of wind power had been misrepresented by politicians, in order to make it palatable. After a while, he was no longer a welcome guest on BBC talk shows on the subject; political censorship and group think ruled.

In his analyses of steam performance he was always meticulously fair and balanced, always seeking to praise. And yet there was something about the reverential tones in which he wrote about the feats of 'Abercorn' in 1939 and 'Hamilton' in the 1980s and 1990s, that left me in little doubt where his heart lay. It emerged in conversation that he had lived in Oakington Manor Drive in Wembley, where I also lived 1968-69. I feel sure that the Doug we knew was shaped watching Duchesses, Scots and Jubilees hauling heavy loads uphill through Wembley, but Old Oak Common, Clapham Junction and Wood Green were never far away.

I was part of a discussion some while back about the relative virtues of Round top and Belpaire fireboxes. The Crewe (LNWR) and Doncaster men won out. Doug ruefully agreed, but said 'yes but Belpaire fireboxes look prettier'. So next time you see a Stanier LMS locomotive, smile and think of Doug..

# DARJEELING HIMALAYAN RAILWAY B-CLASS 0-4-0 (WT+ST) A MODEL FOR IMPROVEMENT?

Owen Jordan

When a potential client, in this case a wholly-owned subsidiary of Indian Railways once, if not now, the world's largest employer, and certainly the owner and manager of one of the world's largest and most intensively used rail systems, asks this question, it is certainly worth spending a little time looking at the matter. That is exactly what John Hind, Jamie Keyte-Smith and Owen Jordan did over a number of weeks earlier this year, and the insights and lessons to be gained from the exercise are well worth sharing with a wider audience. The subsequent offer of service is at present with the client, so this review must of necessity be confined to the background to that offer. Further updates may of course change matters, but what we have, in terms of what is either in the public domain, or could be ascertained at first hand by a visit to Statfold, is a goodly body of information. Statfold housed the chassis of a UK-based B-Class, and while rather less than the whole locomotive, did allow examination of some parts that would normally be inaccessible.

**Background**

For those unfamiliar with the Darjeeling Himalayan Railway (DHR) B-Class, it is, like its railway, a product of the high days of the British Empire; designed and built in Britain by British engineers. As the class letter implies, it was preceded by the A-Class, but in terms of numbers built – 50+ - and over time – four decades – it rivals perhaps its equally small and useful North Eastern Railway 0-6-0T; a standard traction pack of the times so complete in its design that no useful alterations to the locomotive were made over its service lifetime.

The DHR, in contrast, is a 2-ft gauge railway designed to fit the hill country between the plains of Bengal and the foothills of the Himalayas at Darjeeling. It has no UK equivalent in terms of its original concept, which was primarily military – control of a potentially wild North East Frontier. In those terms the railway was an outstanding success – it kept the peace. In terms of doing its day-to-day job, the 55 mile railway was designed to be as self-contained as possible. The obvious place for a dedicated locomotive works, at Siliguri, was ignored for a defendable site on a high ridge at Tindharia, near the middle of the line and well into the hills. As a railway, this meant hauling all materials for carriage, wagon and locomotive overhaul up the hills, since none was available locally barring some timber. It meant also a locally based dedicated workforce who could not reasonably be otherwise employed at such a location, precipitous to a degree unknown here.

The DHR, as a transport facility with military overtones and not that distant from the 1947 created border with East Pakistan (now Bangladesh – various connections and branches closed before and after partition, leaving just the main line), thus retained its strategic role in the minds of managers and politicians into the 1970's. As a consequence Tindharia works was comprehensively re-equipped with state of the art machine tools sometime in the 1970's, at which point the B-Class was still a front line traction package, the youngest of the locomotives then being no more than fifty years of age.

Fast forward another half century – I find they whistle by at some pace these days – and the DHR is no longer a strategic asset, but an increasingly challenging World Heritage liability. A new road to Darjeeling – replacing the Cart Road that was built alongside the railway the whole length of the route from Siliguri – has meant the motor bike, car, bus and truck now carry the local traffic. The Siliguri urban area is extending rapidly over the plain towards the Terai, no longer the jungle haunt of tigers and other exotic wildlife, and rapidly rising populations in the hills have contributed to a series of major landslips that have transformed the permanent way into - in parts - a very temporary way indeed. The ruling grade of 1:28 is now interspersed with short pitches as steep as 1:12, some spiral loops have been replaced with zig-zags, and the back end of Tindharia Works has vanished down slope in a

landslide that took with it the railway itself as well as the ends of the works buildings.

As the railway saw its traffic leak off to road transport, so India Railways appear to have cut the railway's coat according to the cloth available. Tindharia works lost its dedicated staff, the steam traction was first supplemented by and then mostly replaced by diesel locomotives, and the railway by degrees became a tourist attraction. But only in part. A handful of the B-Class were retained, but as the nationalised railway in Britain discovered, the disparity between working conditions on a steam railway and those on diesel and electric traction fitted uneasily with a unionised workforce where firemen, drivers, coal breakers, and brakesmen and sandmen – the standard crew of a B-Class was between five and seven depending on the duty – worked on an open footplate (the fortunate ones), sitting on the coal, standing on the front sanding plate, and since the little matter of brakes had not really changed much over time, sitting on the roof to relay braking instructions to further brakesmen along the train.

And yet that 1970's optimism has left a legacy of a good standard of trackwork – an adequate section FB rail on steel or PCC sleepers, pandrol clipped throughout. This legacy has been seriously challenged by the ad-hoc works to keep a line of rails between Siliguri and Darjeeling. That, in its turn, has meant little more than that line of rails and restricts, among other things, the ability of the B-Class to haul a paying load. As with the UK, where we have more experience (some of it very dearly bought) in the preservation of narrow gauge railways than any other country, a line of this length – 55 miles – fits very uneasily into a working steam heritage railway as it has matured into in the UK, for a number of reasons. India, quite naturally, has its own view of its heritage, and it appears that, while Tindharia works is unused for its designed purpose, most if not all of the 1970's era machine tools are in situ; something of a contrast to many of the ancient but serviceable machine tools to be found in UK heritage workshops.

The DHR then, finds itself very much a longer version of even the combined route of the Ffestiniog and Welsh Highland railways, with much of the route north of the Terai on gradients and curves of a level of ferocity we would once have associated only with mineral branches in the South Wales Valleys. The B-Class is its iconic locomotive, mentioned in despatches in the World Heritage listing. What then, since there is clearly a disparity between the heritage traction's ability to haul on the railway as it now is, and the need for some sort of workable business plan, to do?

## An Outline of the B-Class

The B-Class is a conventional British product of the private locomotive builders of the third quarter of the nineteenth century, built for conditions in a far-away country where the one thing the locomotive was never likely at the time of building to suffer from was a shortage of labour to service it. Or working conditions where health and safety amounted to nothing more than a plate to stand on and a handrail to grab. If you were fortunate; the coal bunkers and the roof were alternative lodgings for loco crew. That the design has outlived the workplace acceptability of that basic design concept is in itself one of the problems now faced by the DHR; it is a very different working environment from the cab of modern traction.

In strict engineering terms, the locomotive is a riveted plate framed well-and-saddle tank with two driving axles, outside cylinders and slide valves. The wheelbase is short to cope with sub-2 chain radius curves, and there is no backplate – just a rail at waist height - to the footplate, for the simple reason that the footplate itself is short to prevent excessive throw-over on curves. Fire irons in use project well beyond the footplate itself and are probably used only when the engine is stationary. In all other respects, barring the flange lubricators, it is typical of the age that created it. There are oil dashpots for the plain bearings, but no balance weights or springs for the lever operated reversing shaft. The original piston tail rod casings projected over the hand sanding positions, which have handrails for the operators, a big sandbox under the smokebox door, and holes in the plating the sanders stand on to enable them to pour or shovel the sand onto the rails.

The original boiler predated the development of superheating and was probably a wrought iron shell with a copper inner box; it is unlikely that any of the original boilers survive, but not impossible. Tubes are short, the firebox proportions classic; an easy to fire sure steamer with reasonable fuel and plenty of labour to tend it. The locomotive is designed to face uphill, since the 'sanding gear' only operates when the locomotive faces the grade. This suggests that the locomotives were never intended to cover the whole fifty five miles from Siliguri to Darjeeling in one go, as the departure from Darjeeling is steeply uphill to the summit of the line. Coal capacity is also inadequate for a full load/full trip. The numbers of engines supplied also infer this; a dozen locomotives in steam would cover six round trips a day with engines changed four times per trip and double manned (perhaps as many as a hundred 'footplate' crew per shift for just the main line). When the line was at its fullest extent there

would have been work for all the locomotives, but it is clear that has not been the case for some time, and the reduction in the retained stock reflects this. With overhauls at India Rail workshops remote from the line, an excess of numbers today permits a relaxed attitude to the timing and length of overhaul. This in itself begs the question of the viability of any kind of updating, since the cost of overhaul would be only marginally affected by longer bearing life, for example if, as looks to be evident, a number of key components could not have any useful life extension processes applied

In service, the B-Class can only be described as a basic workhorse. It is not designed to be fast, nor can comfort for locomotive staff be anything other than absolutely basic, too; room to stand and something to hold onto, nothing more, not even anything by way of weather protection beyond a cab roof. With very tight curves and clear evidence of frame flexing, liberal clearances in the axle boxes and horn guides are a given, and a thumpingly uncomfortable ride, even when fresh from overhaul, is guaranteed as soon as the regulator is opened. Wear in the motion is probably fairly rapid, though at mileages equating to no more than perhaps fifty per day, that might mean as much as two years between intermediate repairs. With slide valves requiring relining at anything from 10K to 25K miles, an intermediate would probably be dictated by that valve wear rather than the rest of the motion. It is notable that one of the features of the now disused works at Tindharia, is the wallboards detailing the motion tolerances the B-Class locomotives are to be overhauled to; the results of long experience. Hinting, in large letters, that this works, and woe betide anyone who begs to think differently.

The success – longevity – of the B-Class can thus be attributed to it being appropriate to the task, and reliable. Sure footed when slogging up the grades and able to re-start with confidence when needed at places – such as the numerous curved at-grade crossings of the Cart Road – where adhesion is problematic at times. As such, a significant rebuild of the locomotive to extend times and mileages between intermediate overhaul, and reduce the extent of the work at those overhauls, looks to be a challenge. There is, de facto, no relief possible on ride quality due to piston thrust; the clearances are there for the curves and have to stay. Such a project however has a whole host of other variables that need to be considered, not least just how you make the B-Class haul a full load up a gradient that is twice as steep in parts – and more – than the original railway was built to. Or, indeed, how you formulate a business plan that covers the whole fifty five miles of the line and includes steam – never mind B-Class steam, as designed or rebuilt – that gives some sort of revenue stream to justify any work at all.

## From Local Service to World Heritage

The proposal received from the DHR to rebuild a B-Class locomotive to reduce maintenance and increase time and mileage between shopping can be construed as more a starting point for a discussion around ‘where do we go from here’ rather than a direct proposal. All engineers and project managers justify their consultancy fees by working out what the client needs, and supplying what is eventually agreed, not what the client thinks they want initially. Such a process can consume a significant proportion of the man-hours on a project, and only really pays dividends if it results in repeat orders or commissions. But professionally, it is the only acceptable course.

The shift from critical local service provider – shifting goods and people between the plains and the hills of Bengal – to, in the words of the local parlance, a ‘toy train’ – operating - probably – as a kind of national pride reaction to the granting of World Heritage status, is thus a critical starting point for answering the problem of ‘what to do’. The business model the line was built to, that of a strategic military asset with a secondary purpose of local transport and, at least until 1947, assisting the seasonal shift of heat-sensitive non-native servants of the Empire, no longer applies in any shape or form. The current tourist-only service on the hill section, mostly from the summit to Darjeeling, has echoes of the early days of heritage railway operation in Britain. The rest of the railway is essentially unused, meaning that there is no revenue accruing to India Rail by transfer from the broad gauge at Siliguri, nor any exploitation of the potential of the line from Siliguri, through the suburbs and over the Terai – surely part of the India the world goes to see – warts and all.

That is part of the wider picture, and before we abandon that and look at what the steam traction options are, we can perhaps learn a lesson or two from the home front, where, as you might expect, we have to a degree both been there and bought the T-shirt.

British heritage experience has demonstrated that the two foot gauge on long and twisting grades is perhaps ideal for tourist operation, so the DHR is well-blessed on that front. The only line – actually two – of any comparable length whose original business plan talked extensively in terms of the whole through trip is the Welsh Highland/ Ffestiniog. The original proposal to rebuild the WH was based upon the journey opportunities that would be generated round and through Snowdonia by a continuous line of rails from Blaenau to Caernarfon. That is how it

was sold to the planners; a new rail-based tourist access to the national park. At that point the Ffestiniog was complete betwixt Porthmadog and Blaenau, and had been for some time. Perhaps surprisingly for such an area, the trackbed of the WH was mostly unoccupied and had only been turned into a footpath at Aberglaslyn, though various other parts could be walked. A rebuilt railway was practical without too many nationalist toes being trod upon too hard; Blaenau had shown what a railway – even one restored by mostly English people – could do for a town fallen on very hard times indeed. Quite a bit of nationalist pride was swallowed in the process of getting the WH rebuilt. We should not for one minute imagine that India, with numerous peoples and a multitude of languages as well as Hindi, is any different from Wales in that respect.

The WH was thus rebuilt in its entirety, including a new stretch to reach Caernarfon from Ddinas, but not the critical bit to reach the standard gauge at Bangor. The capital for that new build was significant, and I will not try to explain here how that particular circle was squared. It was possible to do the whole route in a day, but the missing link made it unlikely that anyone would try and complete the whole circle. As a consequence the WH north of Beddgelert has over time been reduced in status, and the whole concept of a long narrow gauge tourist railway carrying primarily through passengers was abandoned. That made the traction – possibly part of the problem – a bit of a white elephant. The NGG16 is not a cheap to run locomotive.

So lessons can be learned from UK experience…

## Traction for a Fifty Five Mile World Heritage Hill Railway

The heading says it all really. This is a serious – and expensive – concept. Neither the Harz, nor the Durango and Silvertown, are either as narrow a gauge or as long, and as for altitude change, the DHR is a whole order more challenging. In a class of its own, Andean railways apart: South Africa, long the place for the hard worked two foot gauge, has essentially abandoned it in the twenty first century.

The first point is probably the most critical; as things stand the B-Class cannot haul a paying load the full length of the line, were such a load on offer. Indeed, it is probable that, unless the line is regraded to eliminate the seriously steep sections, the B-Class cannot be used except as it now is – on short haul tourist trains of limited length between the summit and Darjeeling. With an axleload of 7T and even short sections steeper than 1:15, only a single coach could make the through journey behind this locomotive unless banking was supplied at the key points; possible but practical?

So a rebuilt or refurbished B-Class fleet shuttling betwixt the summit and Darjeeling with two coaches, looks the only possible option for that locomotive type unless the DHR rebuilds parts of its permanent way. Would a rebuild to eliminate some of the chassis lubrication issues be worth doing? Would a modern boiler make a difference? Coal firing would remain the best choice, since coal can be supplied from Bihar, or Assam, if not closer to home.

The problem of making the costs stack up would undoubtedly remain. UK heritage rail ticket prices have soared since the early days, but four to six coaches is the norm on the two foot gauge, so we can take that as the baseline for making ends meet. Two coaches looks closer to the Snowdon Mountain model, and there steam power is not guaranteed on any train. I long ago decided the best way up Eryri was to walk…

## New Build?

This is something the UK heritage industry took to its heart early on. New narrow gauge traction in steam format might be pricey, but not at the eye-watering levels of the full size train set. New build gave the railways that dipped their toes in the water a vision of the future; late 20th century engineering standards made for excellent locomotives. Over the last five decades there have been notable successes, some serious learning curves ascended, and as the ASTT itself has demonstrated, there are some things we can do a lot better than the engineers of the Railway Age.

The key to keeping design cost down, of course, is to keep the numbers of parts, and especially special parts, as low as possible. Standard engineering components are made in a huge range of specifications, from structural steel sections to needle roller bearings and come with price tags that are normally a whole order lower than a one-off bespoke item. Steam has never been a mass production industrial format; small batches have been the norm and design charges are inevitably high, even with numerous standard components. 3D printed castings, either as casting or as patterns for casting, can be cost effective, and built-up castings that are mostly voids and only have metal in the needful places probably have not reached anywhere near their potential as yet; designers with their fingers on

today's engineering world pulse have yet to turn to steam design in large numbers.

New build would not, of course, address the World Heritage status of the DHR and the B-Class on its own; but could form part of a package that included a fully developed steam line from Silguri upwards. That would imply a new locomotive with the capacity to haul a paying load at an economic speed that would fit in with a business plan to see the whole line fully operational. WH status is a fragile thing, and since the revenue streams that justified the B-Class in the first place and led to its very long service life have vanished, there has to be another way to recreate the reality of times past that pulls in the customers. And keeps the B-Class icon in service.

That said, anything over three driving axles, conventionally coupled, would require articulation on the Garrett principle, or similar; two pairs of articulated units look to be the limit in a single chassis, and even then throw-over on curves would be a potential problem, not least since the railway is only a railway when trains pass…

In India, it appears also, that railways cease to be railways if trains do not pass; parts of the DHR have vanished under encroachments, without even the nicety of taking up the rails first. People live their whole lives inches away from the kinematic envelope of even busy broad gauge railways in the cities of India, and if the trains don't run, their living space increases to include the rails they sit on between the trains passing. The importance of getting a steam traction package that fits the particular conditions the DHR finds itself shouldering, is thus probably the key to its survival; as we saw here in the 1960's and 70's, this is a transitional stage from youth to maturity in the heritage world, and the DHR needs to move on.

# A DEBATE ABOUT THE MERITS OF SUPERHEATING - PART 3

## Hendrik Kaptein

A casual observer of this ongoing discussion may well ask oneself: what is going on here? Technologically interesting as historical steam locomotive issues like superheating and / or steam jacketing may well be its real interest seems to be irrevocably historical.

Still David Pawson ardently defends superheating, against more than a few well-documented test results on Chapelon's steam jacketed 160A1 locomotive. His doubts on the efficiency of steam jacketing seem to be based on his application of Perform & Perwall (like) modeling to this engine, leading to results rather less encouraging for steam jacketing than Chapelon's own.

But then – again as noted before – Perform & Co. seem not to take into account the relative lack of heat conduction in superheated steam. Thus a small part of this superheated steam only conduces to heating up cylinder walls, pistons etc., leading to wall effects even at relatively high loads and speeds and even so in compound locomotives (as noted not just by Chapelon himself but by Porta as well). Apart from this Perform & Co. do not really seem to take into account the influences of different loads and speeds on the effect of superheating. (Compatibility of Perform & Co. with test results of a Britannia Pacific at 70 mph is noted, without mention of superheating effects at lower speeds.)

So any incompatibility of (e.g.) 160A1 road test results with this locomotive's performance according to Perform & Co. may well be one more good reason to further developing such modelling.

In the end any such issues could only be really settled by empirical method, i.e. by thoroughly testing real life locomotives fitted with such devices. But then changes of rebuilding Chapelon's 160A1 steam locomotive seem rather slight indeed and probably a bit too much of a hassle for deciding the steam jacket-superheat dispute and its presumably purely intellectual interest for just a couple of ASTT members & maybe a very few "outsiders" as well.

Still there may be more than a few other steam locomotives reconstructed or even newly built, certainly so in the United Kingdom with its extensive heritage steam railway operations. Such (re)constructions may well profit from this discussion, elevating it above the level of mere retrospection.

David Pawson's agenda would be: go on with superheating, steam jacketing is of marginal value only. Or: no revolution here!

This may be contested for several reasons, summarised as follows: 1. Superheating becomes less effective at lower speeds and lower loads. But then such operating conditions are rather prevalent in heritage steam railway operation. 2. Superheating becomes less efficient in larger cylinders (the superheated steam conduction issue). 3. Superheating is not conducive to valve & cylinder lubrication. 4. Superheating causes more valve etc. leakage, further worsening at lower speeds (a much underrated issue indeed). 5. Superheat decreases boiler efficiency. 6. Superheating elements contribute to throttling from the boiler to the cylinders. 7. Superheating elements are prone to wear and tear.

Steam jacketing on the other hand is not hampered by such problems. Especially important for heritage operation is its independence of engine speed and load. This is not to imply that a steam jacketed and saturated engine can be as efficient as a superheated engine. But then a potential slight loss of efficiency (as amply demonstrated by the only "real life" tests available, i.e. on 160A1) may be more than outweighed by better lubrication, (attendant) less wear and tear and so on as outlined above. Less wear & tear implies relatively better performance in (longer)

maintenance intervals. So better service availability may well be the result, with lower maintenance costs. Such factors may well outweigh the effects of any (marginal) thermodynamical superiority of superheating.

So steam jacketing may still be on the agenda, that is, with full inlet steam flow through the jackets. (Less encouraging historical results with steam jackets were hampered by insufficient or even marginal jacket steam feed indeed.)

For the sake of completeness: recent developments in strongly insulating (ceramic) cylinder liners etc. may effectively counter wall effects as well but then this is better left for another occasion.

Thus David Pawson is to be sincerely thanked for his delving into the history of superheating and related issues: “He who does not know the history of technology is doomed to repeat it”. Or start anew … But now we may proceed, on the basis of all this accumulated knowledge, and go on with our own Revolution duly & fully steam jacketed as well.