



Revolution Funding Appeal

We now have a rolling chassis!



Sitting on the back of the chassis is its designer, Jamie Keyte. Sitting in the foreground is Richard Coleby, designer of the cylinders and valve gear (not yet manufactured).

Revolution has now advanced to the stage of a rolling chassis that has been successfully run over the tightest curves of the Stapleford Miniature Railway, demonstrating that its most novel features worked near-flawlessly over some 8 miles of running. The only question raised during the trial was whether the pony truck might need extra side springs (which have been allowed for in its design).

Having proved the concept, we now need to progress the project quickly if we're going to complete it in time for the celebrations for the 200th anniversary of the birth of railways in Darlington in September 2025. To that end, we need your financial assistance to enable us to complete the boiler (design in progress), the valve gear (design complete) and other fittings and components including smokebox, cab and tender.

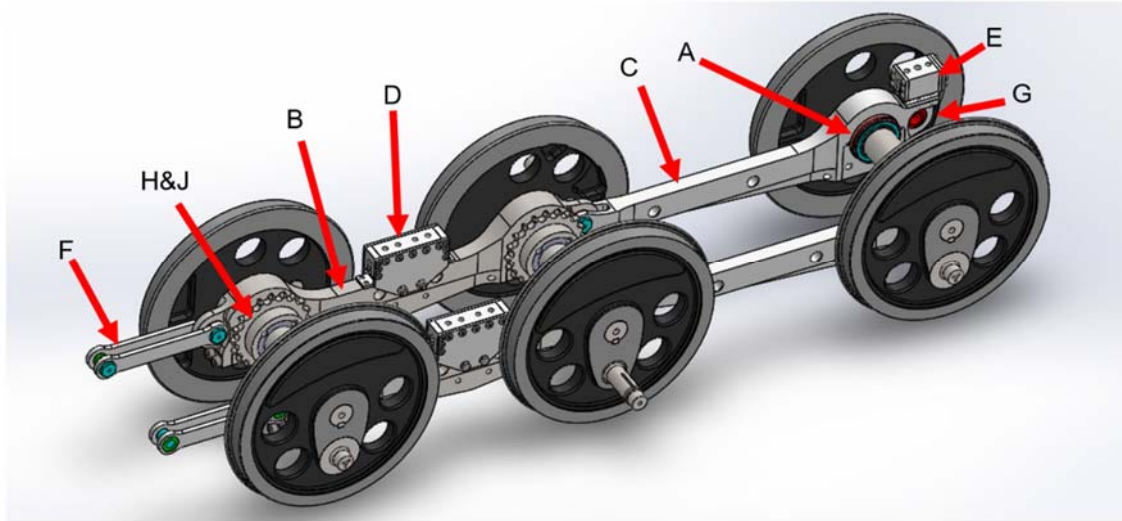
So far, we've raised over £25,000 in donations of which we have spent £21,700. We currently have around £25,000 in place which can be put towards the project, so that by our current estimate **we need to raise a further £30,000.**

This equates to just £10 per month for 2 years from each of our current members or, perhaps more realistically, £20 per month for 2 years from half of our members!

Revolution's Revolutionary Features

1. Revolutionary Frame and Suspension System

It may not be obvious how revolutionary the locomotive will be. Perhaps most revolutionary components are its frames, suspension and axle-keeps. These are designed with the intention of eliminating problems inherent to traditional designs (cracked frames, maintaining axle/rod centres etc.) with a modular system of suspension beams/links where the precision is incorporated at the component level obviating the need for difficult frame alignment.

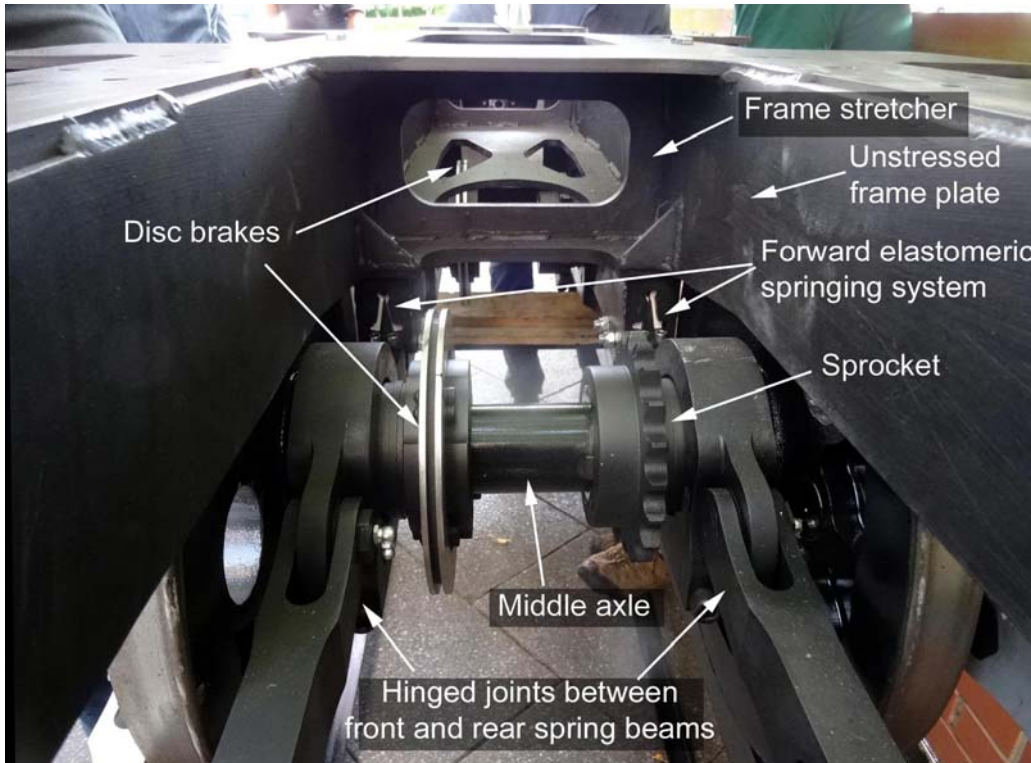
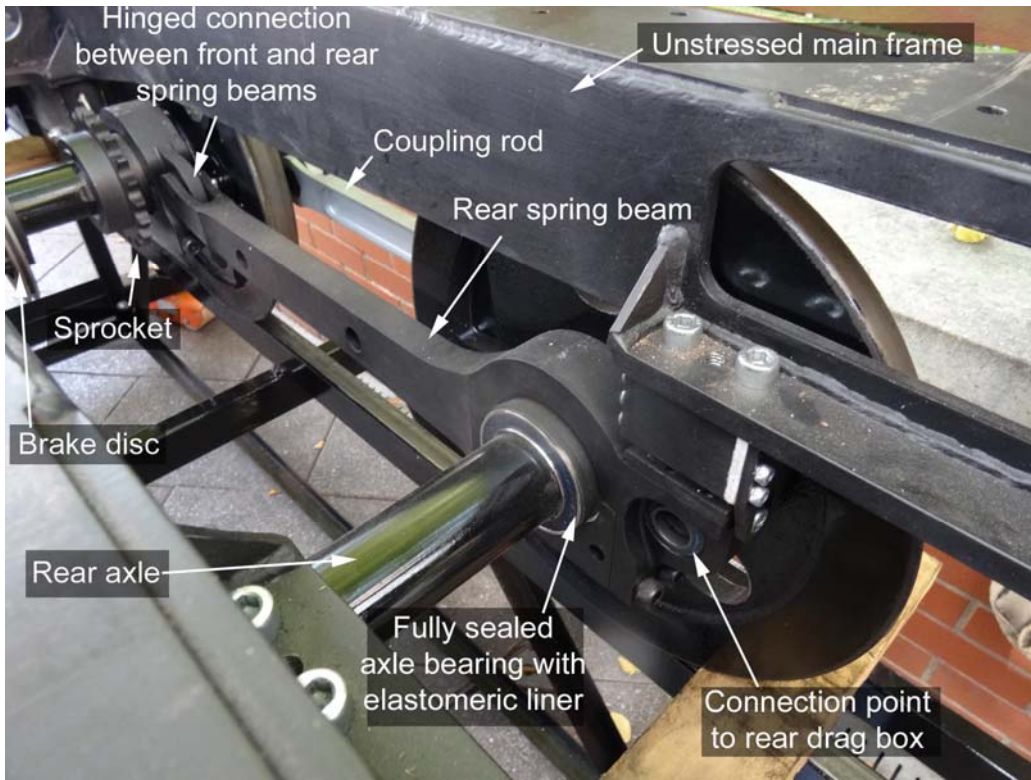


The key features are:

- A. Fully sealed roller axle bearings (x6) mounted in an elastomeric liner providing precise longitudinal location whilst allowing flexibility over track undulations and minimising unsprung mass. Bearings are retained by an under keep.
- B. Main compensated spring beams holding the leading coupled axles at exact centres.
- C. Trailing spring beams holding the trailing axle at exact centre distance, pivoted behind the centre axle at the same centre distance as the coupling rods.
- D. Main springs with elastomeric elements tuned to allow vertical spring movement/compensation, high lateral stiffness and cornering flexibility.
- E. A rear spring with elastomeric elements tuned to vertical spring movement and high lateral stiffness.
- F. Links which complete the force loop from piston through con-rod/crank pin/axle/cylinder cover, ensuring the main frame only has to support the boiler.
- G. Bearings at the rear of the spring beams which allow the traction forces to be transmitted directly from the axles to the drawbar.
- H. Sprockets mounted on leading two axles. One of these is to allow the loco statically tested by lifting the axles clear of the rail and transmitting power through a chain. The second sprocket may be used as a sensor wheel for development of anti-wheel-slip technology.
- J. Disc brakes.

These features can also be seen in the photos overleaf (both looking from the rear):

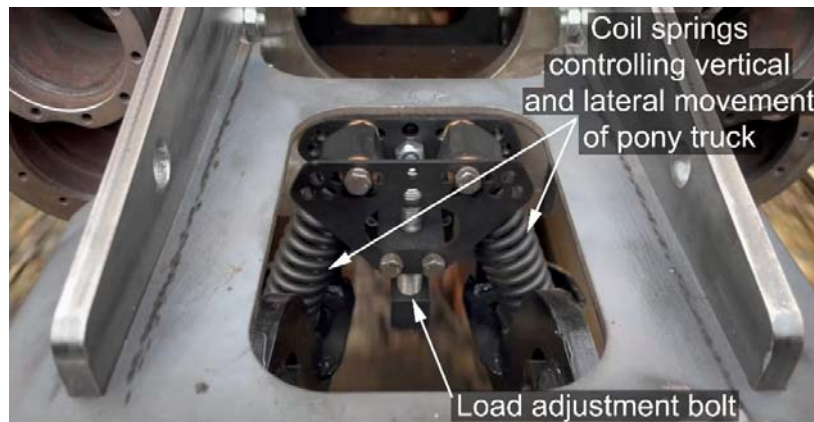
Note on coupling rods: The precise spacing of axle bearings means that *Revolution* will be the first steam locomotive whose coupling rod stresses are precisely known. Furthermore, by hinging the rear spring beam such that the distance between the hinge and the rear axle exactly equals the length of the rear coupling rod ensures that vertical movements between coupled axles will not result in uncontrolled coupling rod stresses.



2. Revolutionary Pony Truck

Another innovation is the pony truck and its suspension arrangement. This consists of two coil springs that provide both lateral and vertical control over the movement of the truck, and an adjustment bolt that can be used to adjust the load in these springs and thus the balance of load supported by the trailing axle. Hence driving axle loads can be equalised with a single adjustment.

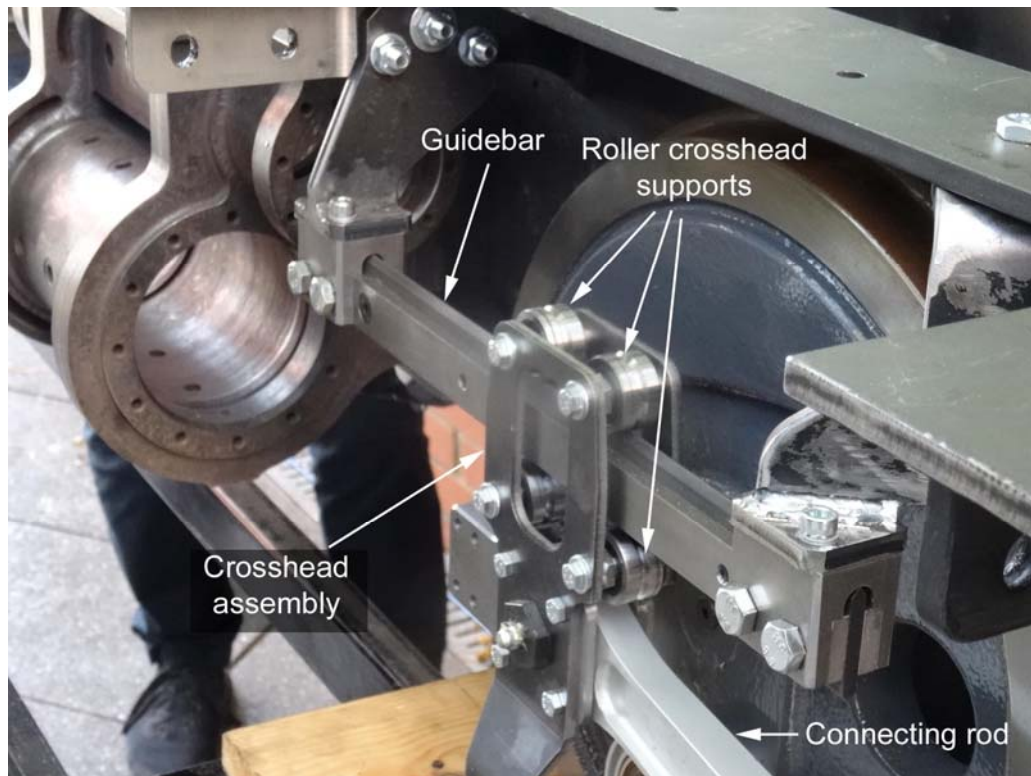
The pony truck springing is designed to be relatively soft so as to maintain driving axle loads under all track conditions. When cornering the vertical load on the outer wheel is increased to prevent the flange riding over the rail.

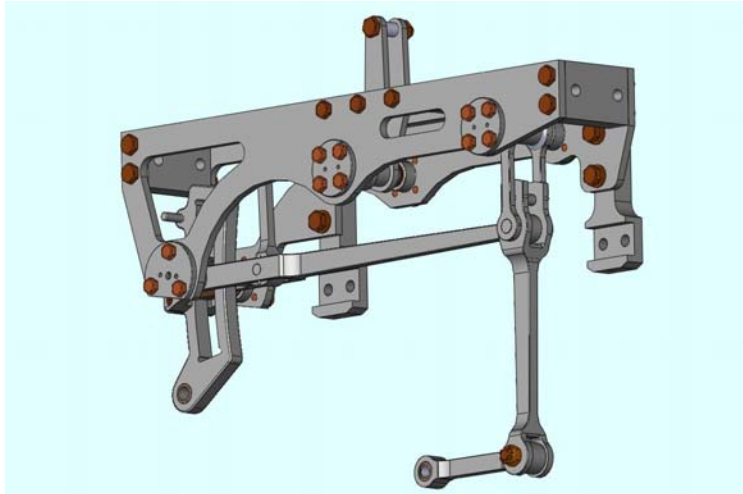


3. Revolutionary Motion

A number of features of the motion are also revolutionary. These include:

- Roller-supported crossheads (installed on chassis and visible in image below).
- Outside admission piston valves driven by internal rocking mechanism (following Bulleid).
- "Prefabricated" valve gear (see overleaf).





Prefabricated valve gear assembly has yet to be built. Designed by Richard Coleby, the components for both left and right-hand sets of valve gear are identical. All joints are to be fitted with roller bearings.

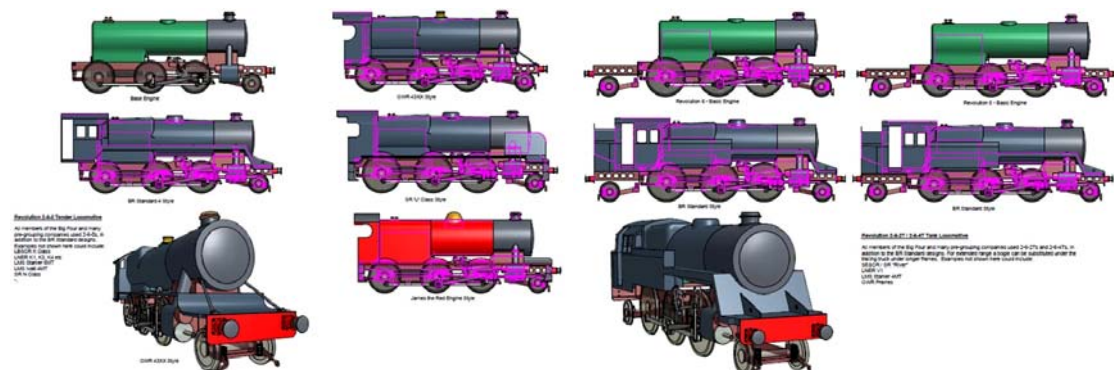
4. A Revolutionary Test-Bed

Revolution will be able to be connected to a miniature 21st Century equivalent of the Rugby Testing Plant. However instead of each driving wheel having to be mounted on a roller mechanism in order to transfer the power generated, *Revolution* can simply be jacked up and a chain fitted onto one of its axle-mounted sprockets (visible in the above images) to drive an electric or hydraulic dynamometer to absorb and measure the power being generated. Thus all sorts of testing will be able to be conducted in static, near-laboratory conditions.

5. A Guinea Pig for Full-scale Development

Whilst *Revolution* is intended to be a guinea-pig for testing out new ideas, it is also intended to provide a model that could be reproduced in standard gauge form that could provide heritage railways a low-cost, low maintenance, high efficiency form of steam traction for handling routine operations, leaving heritage traction to operate on gala days and special occasions. However, in order to appeal to the heritage movement, it needs to look like heritage steam. Hence most of its revolutionary features are hidden from view.

To this end, Jamie Keyte's ultimate concept was (and remains) that *Revolution* can be developed into a standardised full-size design that can be built at low cost and which can be customised to suit individual railways' needs, including tender and tank engine variants as illustrated below.



Funding Appeal

As reported in our last appeal, we need a further £15,000 to £20,000 to build the boiler and fittings, for *Revolution*, and perhaps £15,000 to complete the pistons, valves, valve-gear – or say £40,000 (optimistically) to complete the locomotive excluding its tender. Of this we have around £10,000 in place, leaving £30,000 to be raised. (We can borrow a tender temporarily to get the locomotive running.)

Revolution is an exciting project to be involved in and in many respects one of the most existing steam projects to invest in, which will provide ASTT with a vehicle for years of future research and testing (as well as a lot of fun for anyone who wants to be involved).

Our aim remains to display *Revolution* at the celebrations for the 200th anniversary of the birth of railways in Darlington in September 2025. So once again, we appeal to our members to support this endeavour. As estimated in our opening paragraph, if each of our members could donate just £10 per month between now and September 2025, this should provide enough to complete the remaining components of the locomotive.

So **please help by sending a donation or, better still, by setting up a standing order with your bank to send a monthly contribution to the Advanced Steam Traction Trust's HSBC bank account: Sort Code 40-28-14, Account No 4176 0947.** Or if you prefer, post a cheque (made out to “Advanced Steam Traction Trust” to Chis Newman at Flat 4, 2 Kimmerghame View, Edinburgh EH4 2GP.

If you are a UK tax payer and have not yet signed a Gift Aid declaration, we would be grateful if you could complete and sign the form below, and either email a copy to info@advanced-steam.org, or post it to Chris Newman at the above address. By so doing, we should be able to claim a rebate of 25 pence for every pound that you donate.

GIFT AID DECLARATION

Please treat all gifts of money that I make today and in the future as Gift Aid donations. I understand that I must pay an amount of Income Tax and/or Capital Gains Tax to the UK government each tax year that is at least equal to the amount of tax that the **Advanced Steam Traction Trust** will reclaim on my gifts for that tax year. I confirm that I have paid or will pay an amount of Income Tax and/or Capital Gains Tax for each tax year (6th April - 5th April) that is at least equal to the amount of tax to all the charities or Community Amateur Sports Clubs that I donate to will reclaim on my gifts for that tax year. I understand that VAT and Council Tax do not qualify.

I confirm that I would like all my donations to the Advanced Steam Traction Trust to be treated as Gift Aid:

Signed: _____ Date: _____