

“Revolution” Modern Steam in the Making

AST CONFERENCE OCTOBER 2026

“Revolution” Progress Update

- Progress Catch Up – Jamie Keyte
- Revolution Boiler Progress – Richard Coleby

Revolution – Publicity

- 8 Page article in “Trackside” magazine – April ‘26 issue
- Attended the “Hengist” Open Day at Diamond Group – 11/04/26 Sheffield
- The “George the Fifth” Open Day at Keyte Smith Ltd – 16/05/26 Kirkby in Ashfield
- The Stapleford Miniature Railway event – 13-14/06/26

Revolution – Publicity

Trackside



Revolution

Jamie Keyte and Richard Coleby who are leading Britain's most advanced and unusual steam new-build project - 2-6-0 Revolution. Nick Brodrick

Revolution is coming

He started at Derby Works, but now Richard Coleby is helping second generation Derby man Jamie Keyte to build arguably the most advanced steam locomotive ever. Nick Brodrick discovers Britain's surprising new-build that doesn't have traditional frames

When Richard Coleby walked through the gates of Derby Locomotive Works for the first time in September 1959, any idea that he'd be at the joint forefront of developing steam 66 years later would have been laughable.

Richard's arrival in Derby as a 17-year-old apprentice coincided with the new age; he remembers now-preserved No. D4 (44004) Great Gable being finished off in the paint shop as part of the first batch of ten 'Peaks' during a tour of the works earlier that spring.

In March 1960, British Railways ceremoniously turned out its last steam locomotive – Evening Star. The Hitchin-born and Hertfordshire-bred teenager never expected to land up in the Midlands Works. His hobbies and interests hadn't crossed over with railways or engineering. But when he failed his O-Levels in 1959, his father – a keen miniature steam engineer – spoke to a close friend: BR Chief Mechanical Engineer, Roland Bond.

Bond, whose own career had started as an apprentice for Henry Fowler on the Midland Railway and latterly worked under Robert Riddles for the LMS and BR, suggested to Coleby senior that an apprenticeship at Derby would be good for his son.

Despite the diesels, there would be another three years of crossover with steam repairs at the Works, only ending with the last full, classified overhaul of BR 'Standard Four' 4-6-0 No. 75042 in September 1963.

In between times, Richard gained an intimate knowledge of, and interest in steam, working on all kinds of component parts. He remembers the traditional month-long secondment to Derby's '4 Shed' and "wonderful footplate rides" on the Midland Main Line.

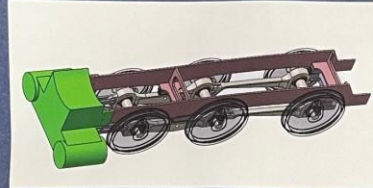
Other apprentices and workshop staff had such interests too; and so a group including Richard formed the Derby Locomotive Works Society of Model Engineers.

"We built a 5in-gauge 'LBSC' Neta 0-8-0, and management allowed us to build a portable track, so long as we used it to raise money for charity".

Rides were provided at local fetes as well as Derby Works' memorable open days, raising money for St Christopher's, the local railway's children orphanage.

However, the society's work would inadvertently lead to a drastic change in direction for Richard's apprenticeship.

REVOLUTION IN DETAIL










- A** The unstressed main frame (1) floats above the hinged spring beams (2). Rather than traditional brake linkage and blocks, disc brakes are being fitted (3) to reduce tyre wear. An axle mounted speed sensor sprocket (4) might also be developed with wheel slide/slip prevention technology. Jamie Keyte/Nick Brodrick
- B** Fully sealed, the axle bearing with primary spring elastomeric liner (5) and the secondary elastomeric (rubber) springs which provide a cushion between the spring beams and frame (6). All: Nick Brodrick (unless stated)
- C** Off the shelf pre-greased and sealed roller bearings (7) are used for the motion, meaning no oil cans or grease guns will ever be needed. Rods are made from aluminium to reduce reciprocating mass.
- D** From the outside, you can see how the frame that supports the weight of the boiler sits above the spring beams (8) through which virtually all of the motion forces pass through.
- E** Although the motion is traditional Walschaert's, the old crosshead and guide bar design has been changed to a rolling crosshead with guide rails (9) to reduce friction and therefore wear. Richard Coleby first used this method on a miniature Curwen 'Atlantic' 30 years ago, which is still running without any maintenance.
- F** Rather than castings, the outside cylinders are a fabricated kit of parts.
- G** The part-built locomotive in profile.

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Revolution – Publicity

○ Hengist Open Day



Revolution – Publicity

- “George V”
Open Day



Revolution – Publicity

○Stapleford Miniature Event



Revolution – Publicity

- Lectures & Talks
 - Revolution is now in the public domain
 - Need to maintain momentum
- Alex Powell's talk to the IMechE 10/02/26
 - Available via AST website
- Talk Aids
 - Revolution is now too big to move without a trailer
 - Back catalogue of progress updates
 - A number of “spare” components available
 - 3D Printed parts

Revolution – Publicity

○ 3D Printed Parts



Revolution – Tender Trials

- Whilst at Stapleford in June:
 - Clearance checks for tender drawgear/buffers
 - Checking operation of the tender running gear
 - Check operation of the tender hand brake system



Revolution – Tender Trials



Revolution – Tender Trials



Revolution – Tender Trials

- However.....
 - Tender bogie was found to derail under certain situations:
 - Entering or exiting curve
 - Where there is track twist
- Causes:
 - Springs too hard
 - Spring dimensional tolerance poor
 - Too much yaw friction
- Solutions:
 - Replace spring elements with softer elastomer
 - Polish and lubricate bolster pads

Revolution – Tender Trials

- Softer Springs – more accurately made!



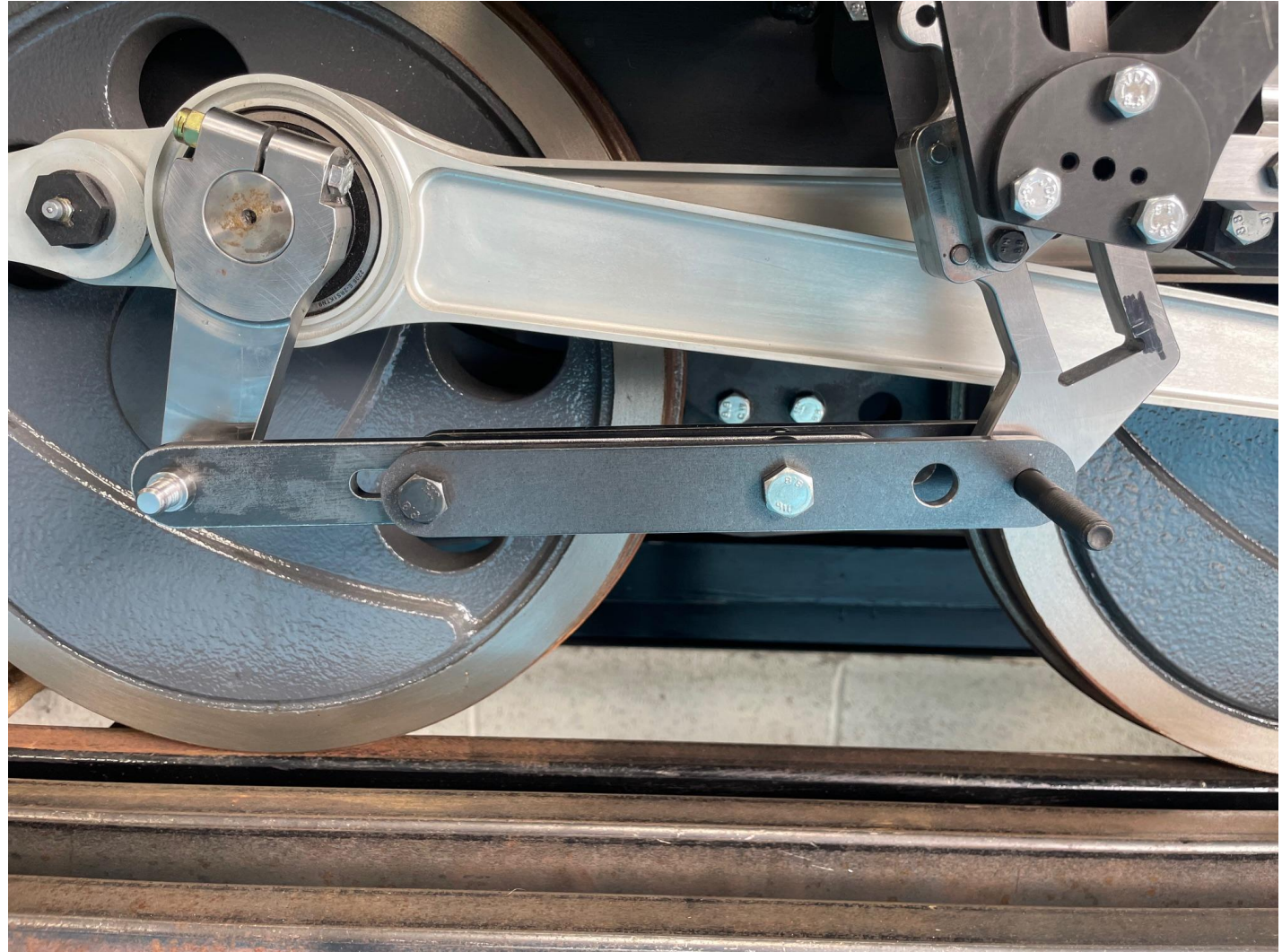
Revolution – Tender Trials

- Bolster support mods
 - Wear pad rubbing surfaces polished
 - Grease Point added



Revolution – Other Stuff

- Eccentric rod measurement
 - Measure twice, cut thrice...
- Linkage clearance checks
- Reverser mechanism parts
 - Hand wheel
 - Dog clutch
- Misc. parts for cylinders
 - Steam jacket manifolds
 - Gland nuts
 - Lock washer



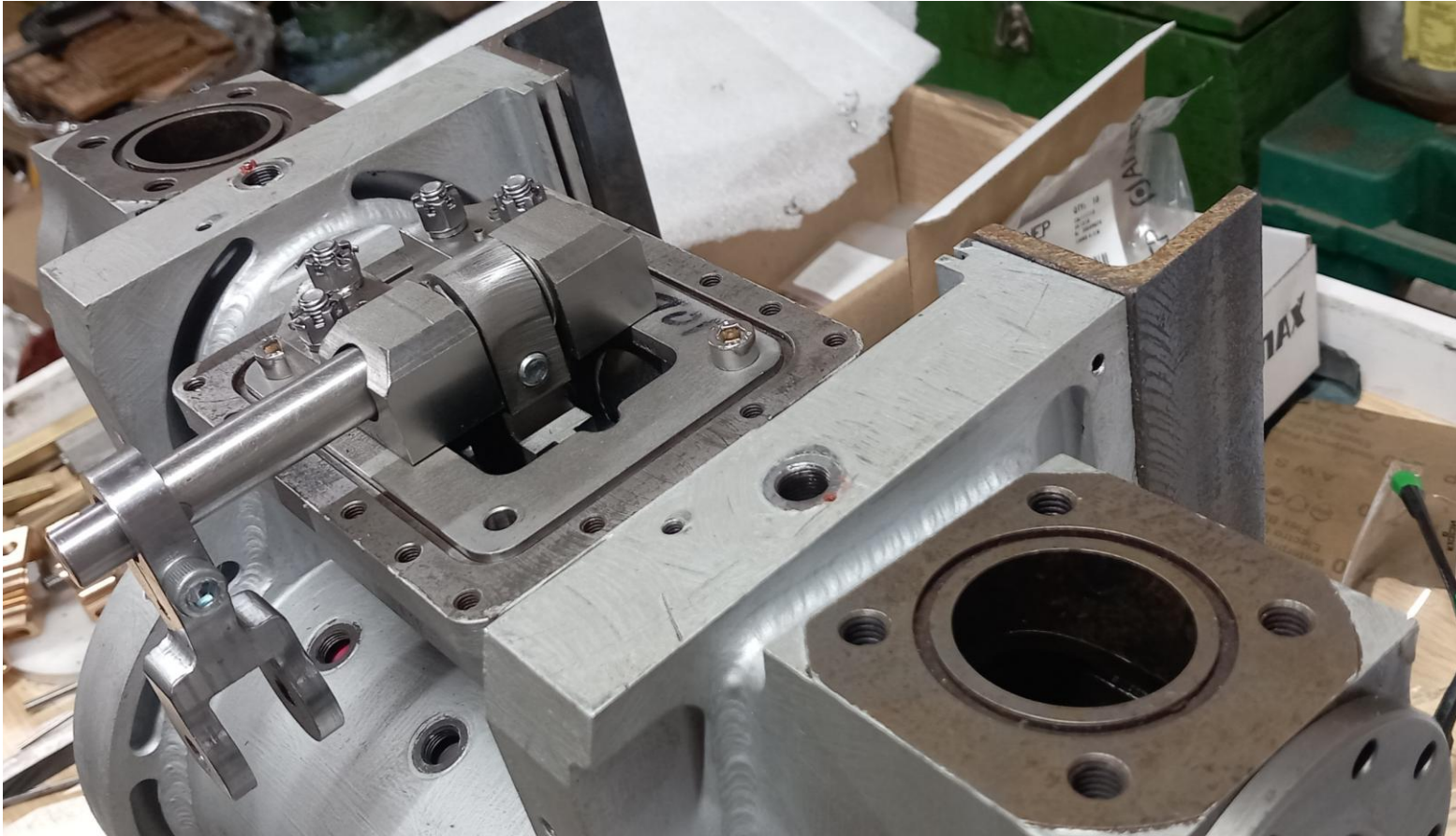
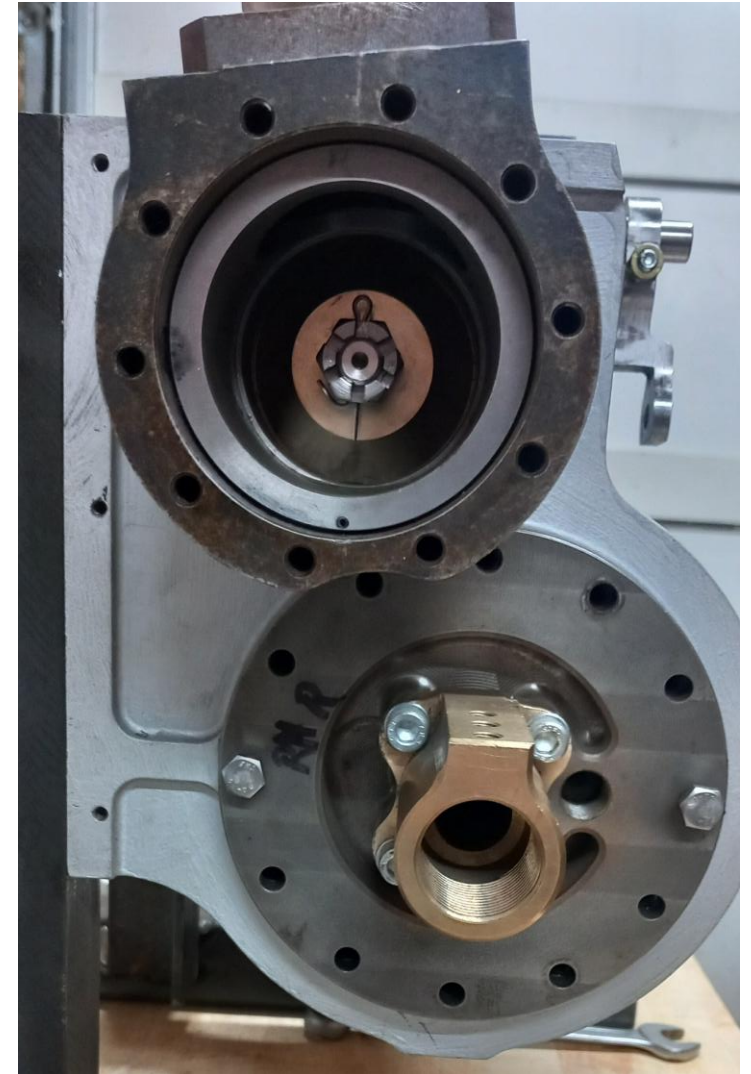
Revolution – Other Stuff

- Mechanical Lubricator



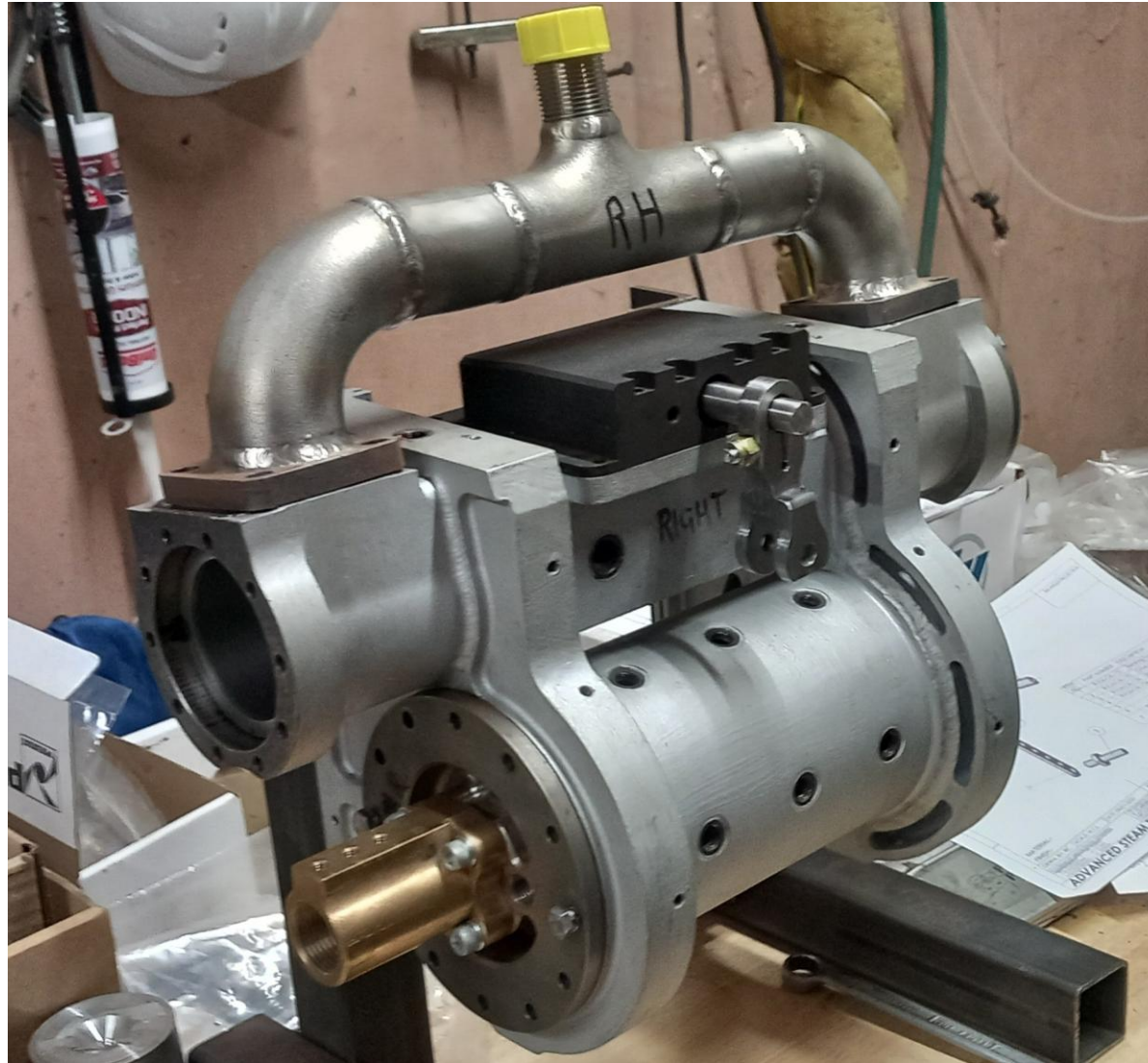
Revolution – Other Stuff

○Cylinder Build



Revolution – Other Stuff

○Cylinder Build



The Boiler

Richard Coleby

Revolution – Boiler

The design background –

1. Freelance or Scale?

- A) Freelance – the choice can be yours: wide/narrow/round/top/Belpaire
- B) Scale – you are in an immediate straitjacket..!

2. What boiler output is required?

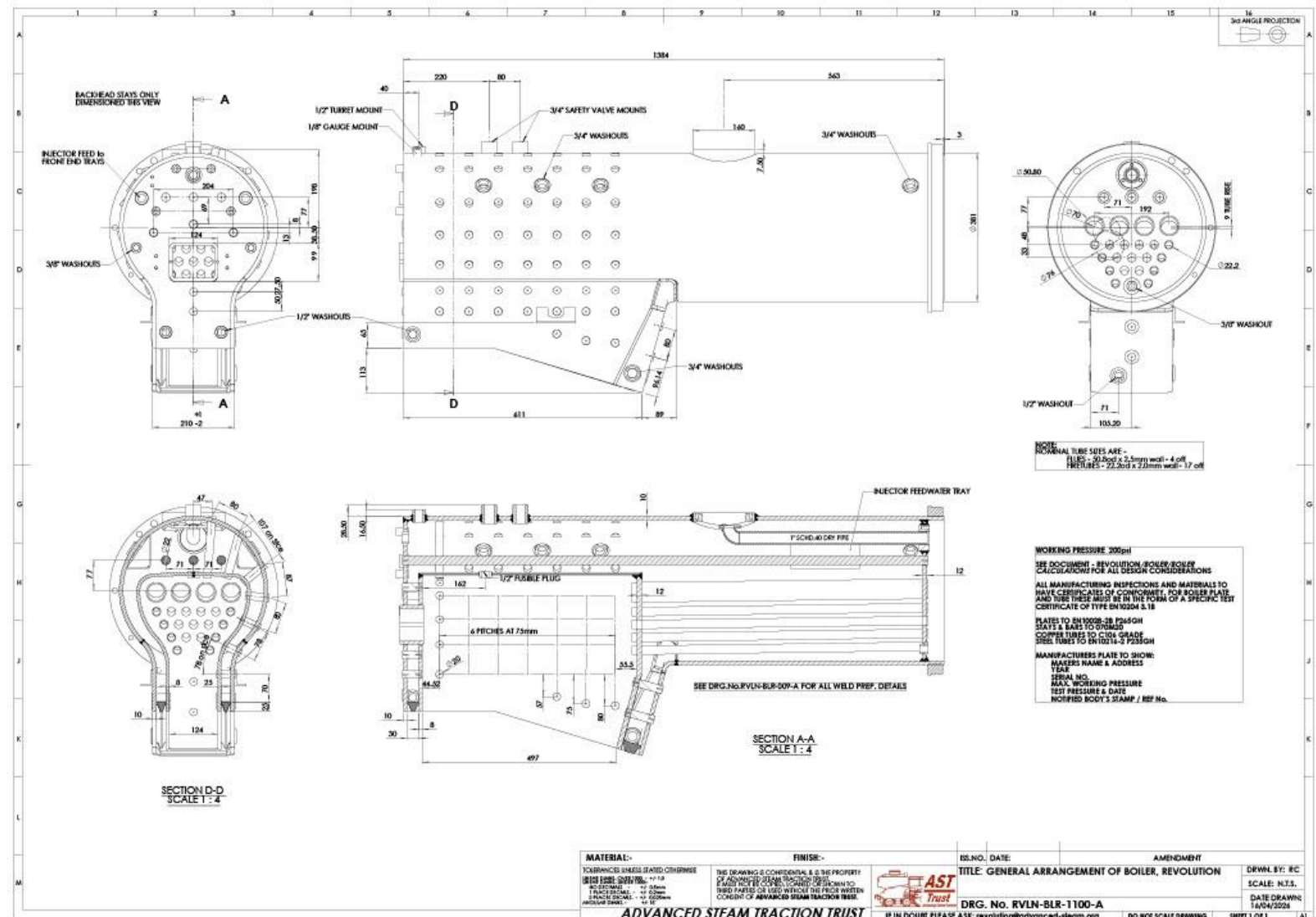
- A) Do you envisage heavy haulage and long runs
- B) Medium runabout and short runs
- C) Superheated or saturated

Revolution falls slap bang between 1A and 1B but is definitely 2A, which just leaves the choice of Belpaire or Roundtop

Without true scale to worry about Roundtop has certain constructional advantages, is easier to stay and the small loss of steam space compared to Belpaire is negligible in small scale.

Revolution – Boiler

○The Result..



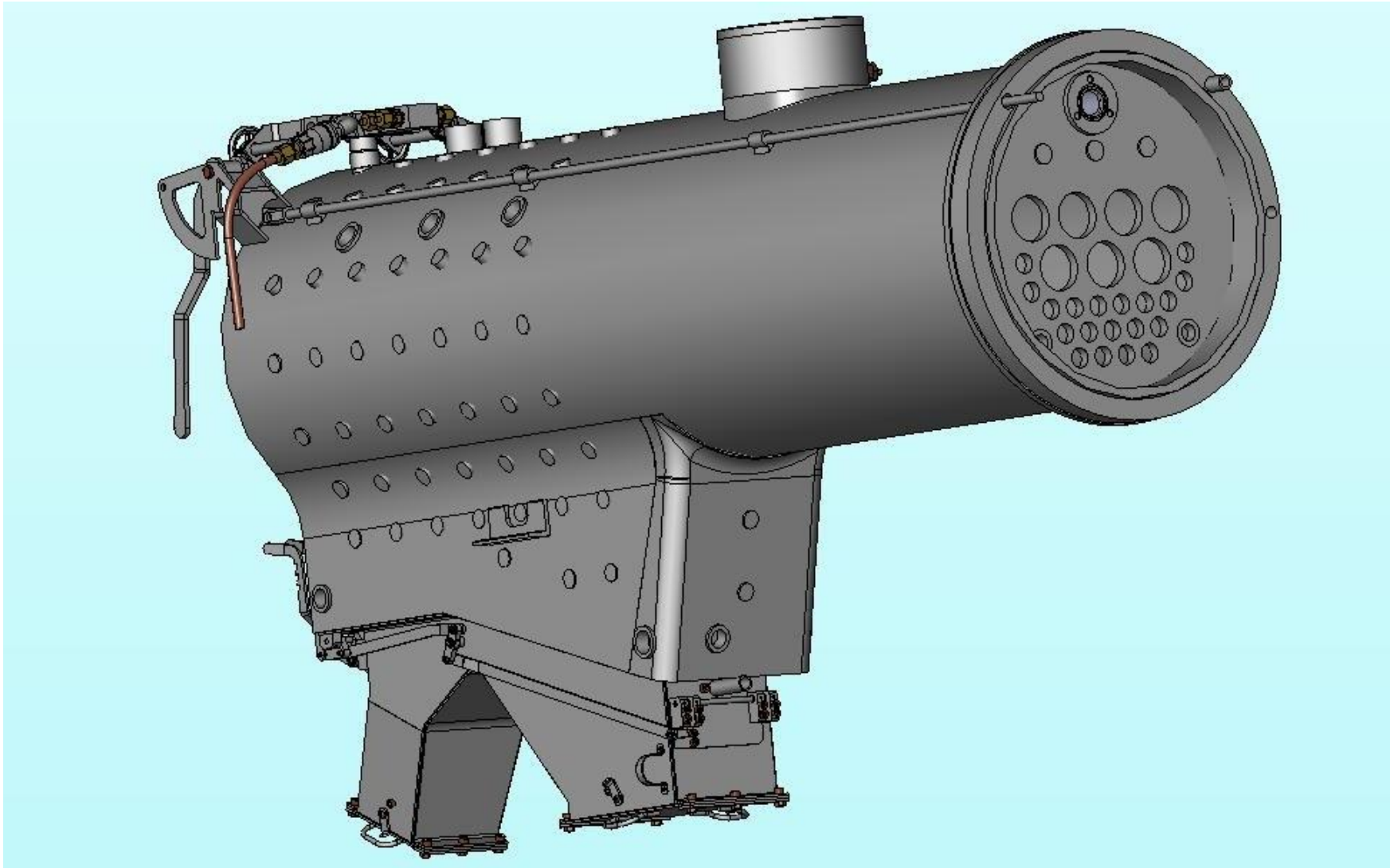
Revolution – Boiler

Revolution specific considerations –

- Based around a 'Super Curwen' Atlantic performance so able to produce a good tractive effort on a continuous run.
- Higher boiler pressure than normal for test purposes.
- A large diameter smokebox to house a full flow superheater with a 'dry' side regulator.
- An independent emergency stop valve in the dome in case of superheater leakage upstream of the regulator.
- A relatively long smokebox to enable various exhaust arrangements to be fitted including twin exhausts.
- Ability to mount sensors for pressure, vacuum and temperature
- Superheated steam to cab controls for ancillary equipment

All the above has provided quite a challenge within a small envelope whilst still allowing for good insulation depth and a 'scale' appearance

Revolution – Boiler



Revolution – Boiler

The biggest challenge to begin with centred around the mounting of the regulator:

- Normally conveniently placed on the centreline of the engine
- Normally on the ‘Wet’ side of the superheater header

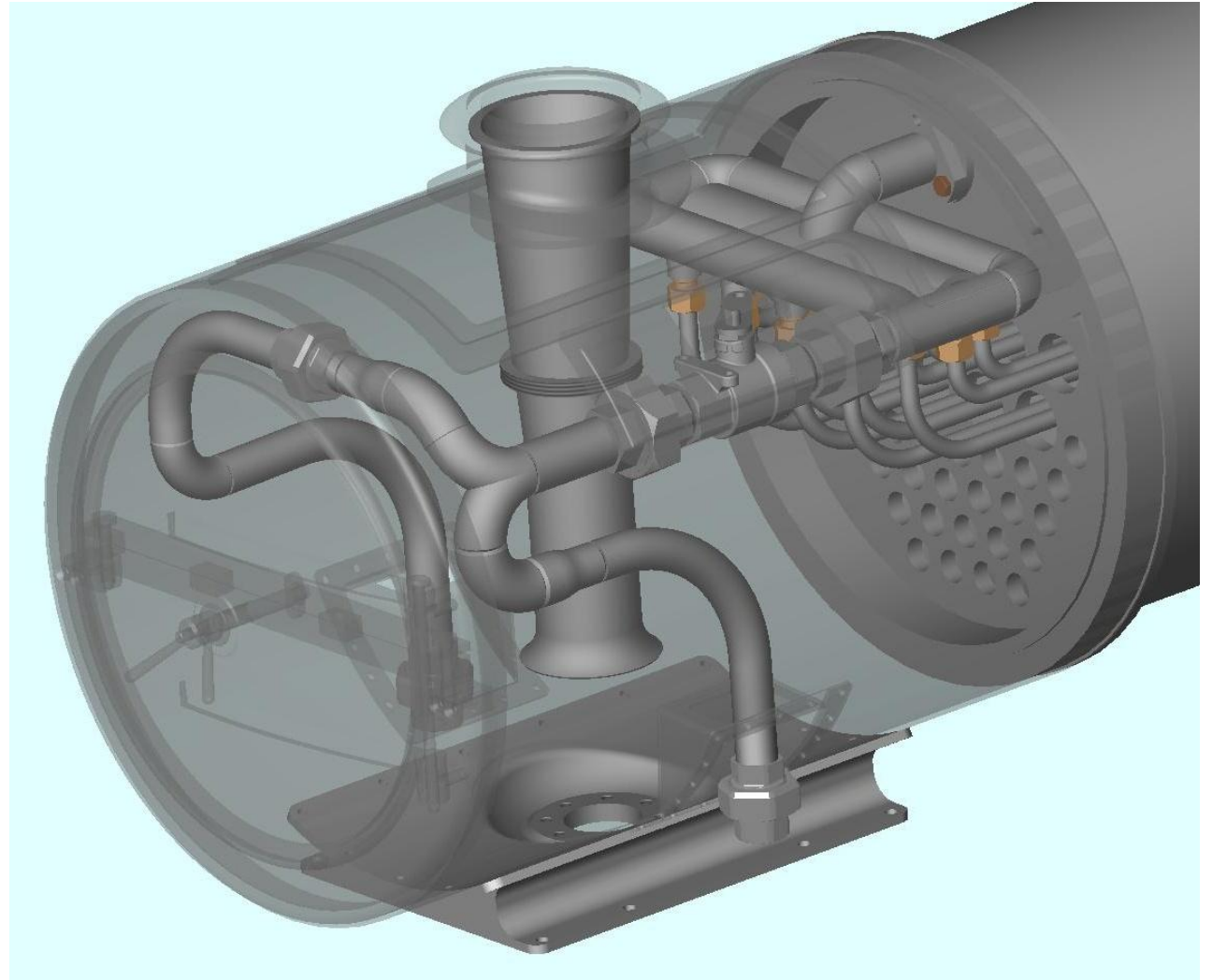
In our case after, in order to examine the benefits of less initial condensation in small scale engines, it was decided to place the regulator on the ‘Dry’ side of the header.

- Note this will also mean graphite seals in the ball valve regulators.

Revolution – Boiler

Due to the need to keep the central area of the smokebox free for the fitting of twin exhausts a dual regulator arrangement has been the only realistic option.

The first iteration centred round a single regulator valve as shown –



Revolution – Boiler

The single regulator configuration:

- Allowed the space for twin exhausts

BUT.....

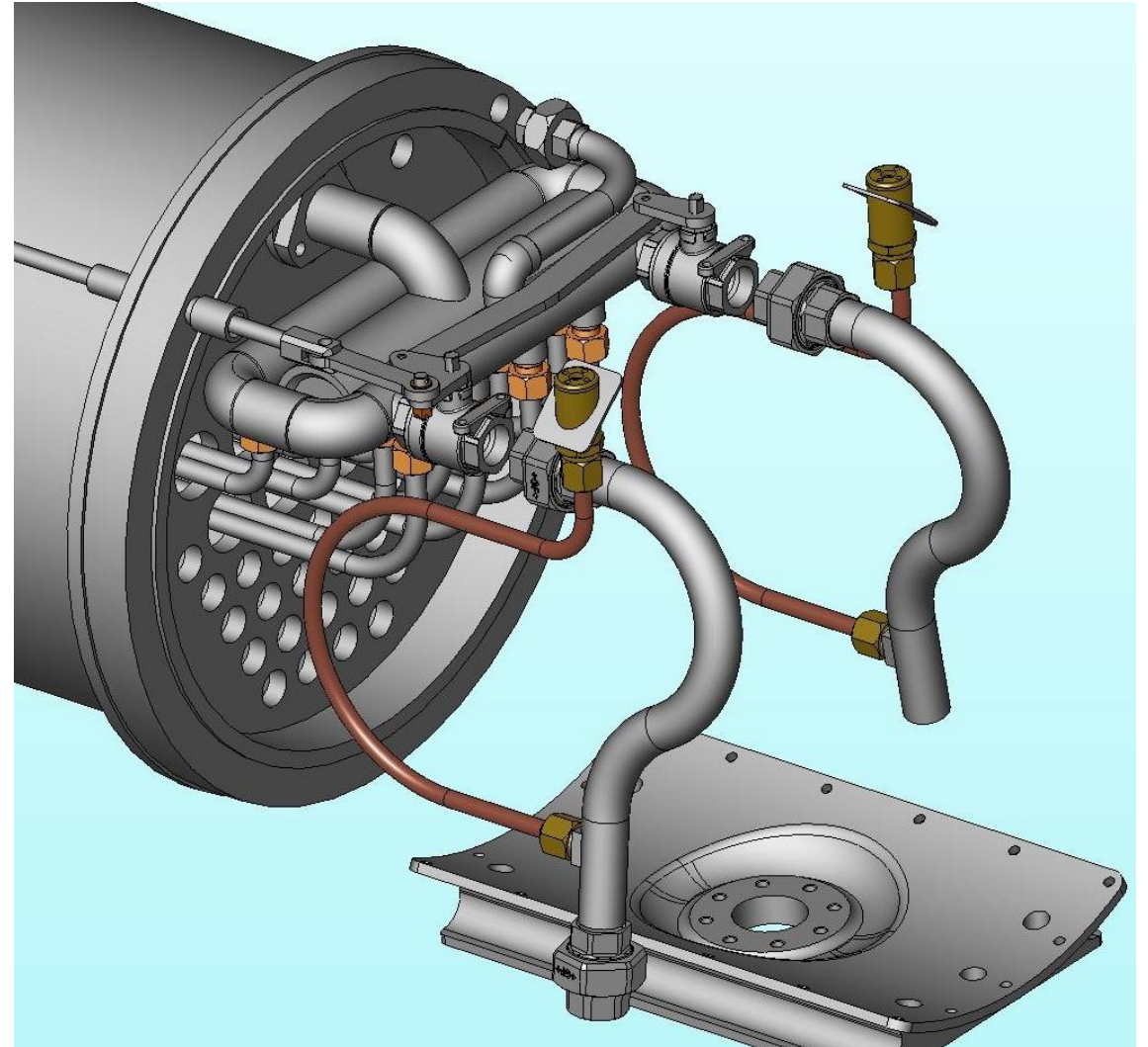
- It involved a roundabout route to reach the cylinder on the opposite side
- It involved some bespoke and inelegant pipework

So was abandoned fairly quickly....

Revolution – Boiler

It became pretty obvious that the only way to achieve our objectives would be to introduce two regulator valves on either side of the header operated by an interlinked lever.

- This was the first twin regulator layout using the originally proposed tube layout with nine s/heater flues.



Revolution – Boiler

At this juncture that there descended from the mount a veritable gift by way of Mr Johnson's Boiler Software package...!!

Many updates and iterations, revisions of tubes, flues and superheaters later....

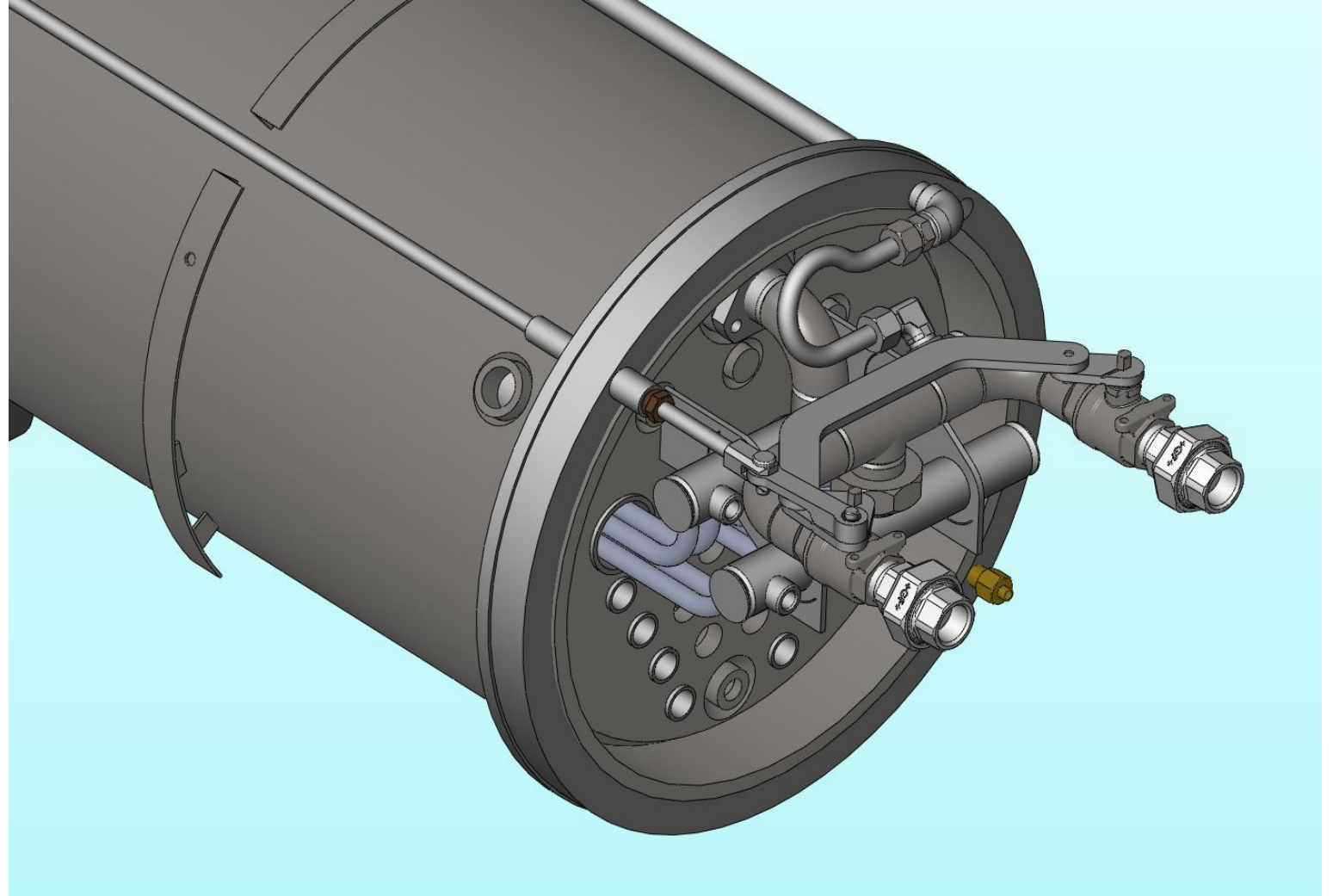
Revolution – Boiler

Outputs from Martin Johnson's Boiler Software

PREDICTED PERFORMANCE				
COMBUSTION GAS FLOW	5.778E-02	kg/s	458.2	lb/hr
CO2 GAS READING	13.42	%		
TOTAL DRAUGHT	66.48	mm H2O	2.62	Ins H2O
TUBE BANK RESISTANCE (TOTAL)	22.81	mm H2O	0.90	Ins H2O
TOTAL HEAT IN FUEL	146.636	kW		
HEAT RELEASE RATE	121.737	Kw	4.1538E+05	BTU/hour
GRATE EFFICIENCY	83.02	%		
MAX. TEMP IN FIREBOX	1444.3	Deg. C	2632	Deg. F
INLET TEMP TO FLUES & TUBES	997	Deg. C	1826	Deg. F
EXIT TEMP FROM FIRETUBES	427	Deg. C	800	Deg. F
EXIT TEMP FROM SUPERHEATER FLUES	398	Deg. C	748	Deg. F
AVERAGE SMOKEBOX TEMPERATURE	411	Deg. C	773	Deg. F
EVAPORATION RATE	3.222E-02	kg/s	255.5	lb/hr
EVAPORATION RATIO	7.278			
ENERGY IN STEAM PRODUCED	97.334	kW		
HEAT TRANSFER EFFICIENCY	79.95	%		
OVERALL EFFICIENCY	66.38	%		
SUPERHEATED STEAM TEMPERATURE	404	Deg. C	759	Deg. F
SUPERHEAT	206	Deg. C	371	Deg. F
SUPERHEAT STEAM VELOCITY (MIN)	8.77	m/s	28.76	Ft/s
SUPERHEAT STEAM VELOCITY (MAX)	13.80	m/s	45.28	Ft/s
SUPERHEAT PRESSURE DROP	6601	Pa	0.97	PSI
STEAM VOLUME	8.295E-03	m3/second	506.16	Cubic inch/s
AVAILABLE VOLUME FOR POWER	8.055E-03	m3/second	491.55	Cubic inch/s

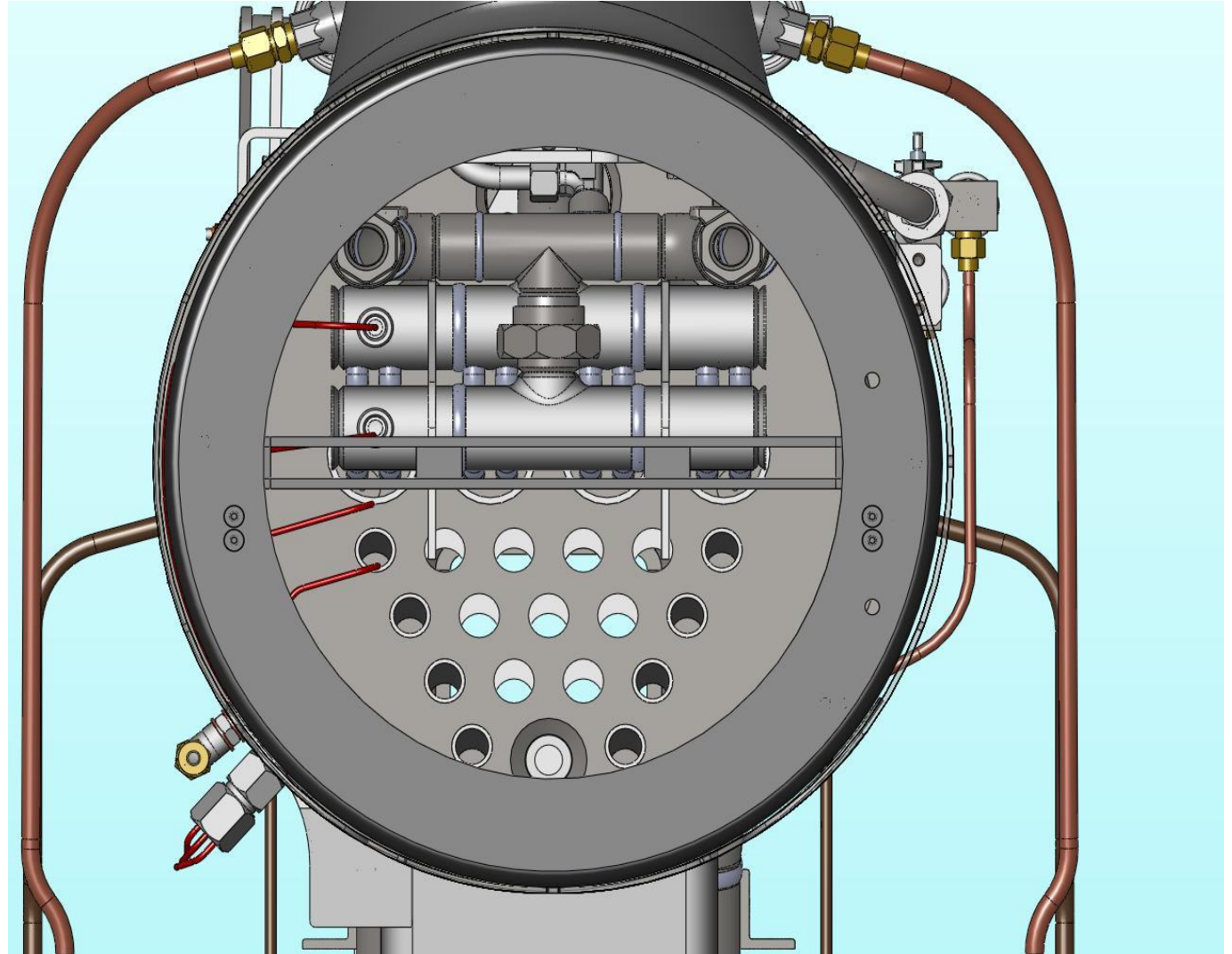
Revolution – Boiler

One major change was to abandon the individual element attachments in favour of an all-TIG welded structure which is now widely used in small scale.



Revolution – Boiler

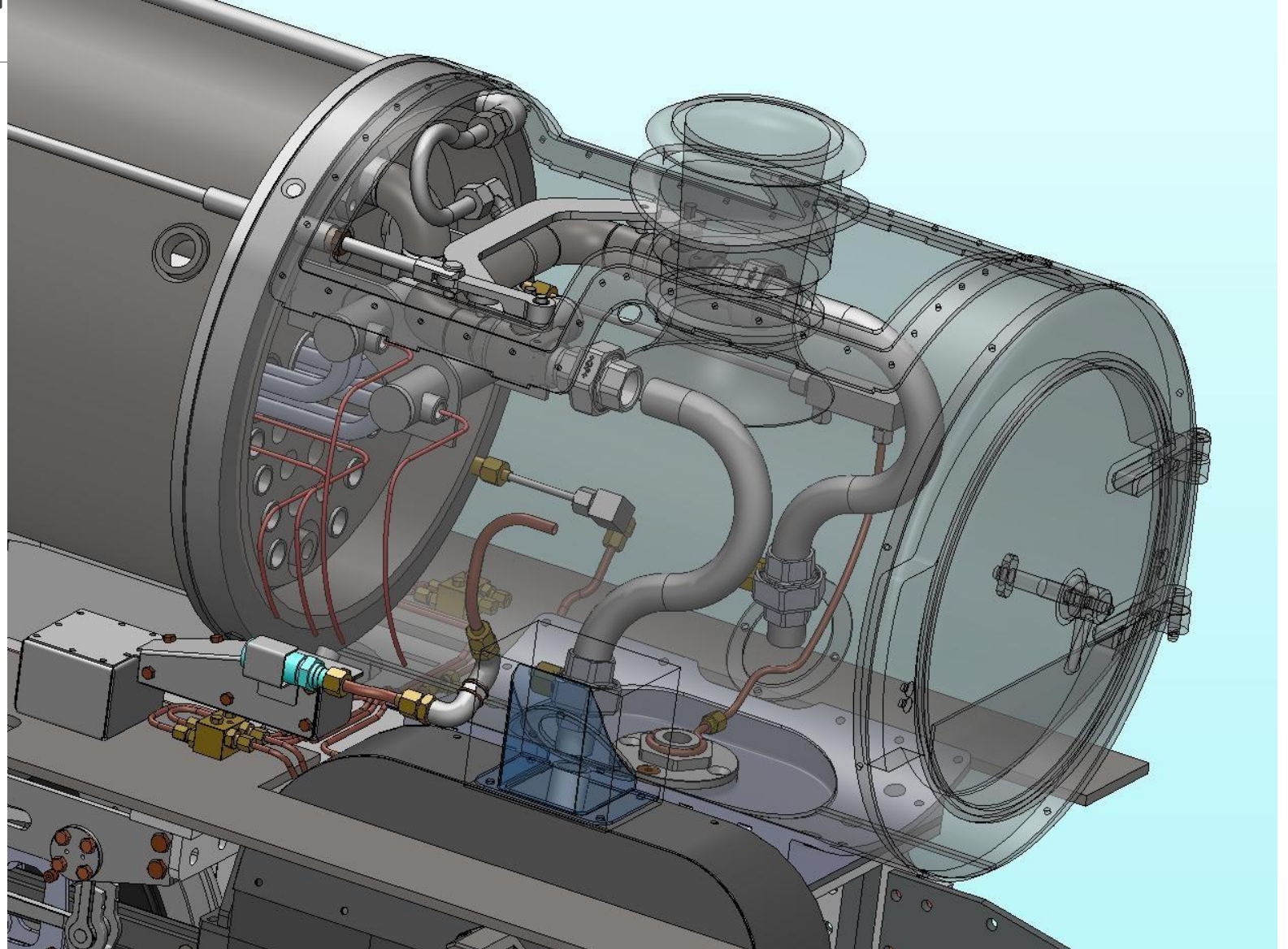
One matter to always keep in mind with s/heaters is how to get them out for repair without having to remove the whole smokebox.



Revolution – Boiler

Current configuration of the smokebox:

- TIG welded superheater
- Double 'Dry' side regulator
- Instrumentation for:
 - Pressure
 - Vacuum
 - Temperature



Revolution – Boiler

Boiler Build

- Design & Drawings
- Approvals Process
- Quotations
- Construction

Thank You!

