

**WIN TICKETS FOR THE MIDLANDS
MODEL ENGINEERING COMPETITION 2026**

Five Pairs of MME Tickets in our Free Competition

MODEL ENGINEER & WORKSHOP

EST. 1898

THE LEADING MAGAZINE FOR HOBBY ENGINEERS AND MODEL MAKERS

www.model-engineer.co.uk

Volume: 235, Issue: 4780, September 2026

Tankfest 2026

**SPECTACULAR MACHINES IN ACTION
AT THE TANK MUSEUM THIS SUMMER.**

**Living with a
Proxxon Mill
GRAHAM MEEK DESIGNS
AN ER20 SPINDLE.**



Superdetailing
REFINING A 3½" GAUGE
PANNIER TANK.



INSIDE this packed issue:

A COMPACT CALIPER FOR THE MILL • COMPLETING THE SILVER CREST LOCOMOTIVE • A TANGENTIAL FACING TOOL • FOURRUNNER MK2 THE V4 STEAM ENGINE • LATHEWORK TIPS • MAKE AN AIR POWERED ENGRAVING TOOL • FASCINATING ENGINES AT THE BOLTON MUSEUM • 3D PRINTING IN THE WORKSHOP • SOUTH WEST MINIATURE ENGINEERING SHOW • 5"-GAUGE MOGUL CAB • USING SUB-FACEPLATES ON THE LATHE • HELE-SHAW'S VARIABLE POWER TRANSMISSION
PLUS ALL YOUR REGULAR FAVOURITES!

THE MAGAZINE FOR HOBBY ENGINEERS, MODELLERS AND MAKERS.



SEPTEMBER
2026

KELSEYmedia

- Fast Prototyping
- Global Community
- One Platform for Model Makers

PCBWay

BRING YOUR MODELS TO LIFE

Your Workshop, Online & Ready

Join PCBWay today and grab your
\$5 welcome coupon!



PCBWAY SERVICES

01 PCB Prototyping

- From **\$5 / 10pcs**
- Free DFM Check
- Fast & High-Quality

03 3D Printing

- From **\$4.98 / piece**
- Wide material selection
- Rapid prototyping

02 PCB Assembly

- From **\$29 / 20pcs**
- Free stencil & shipping
- Ready-to-use electronics

04 CNC Machining

- From **\$24.98 / piece**
- Brackets and gears
- High precision parts



Scan the QR code for more information.

🌐 www.pcbway.com ✉ service@pcbway.com



EDITORIAL

Editor: Neil Wyatt
Designer: Druck Media
Illustrator: Grahame Chambers
Publisher: Tim Hartley

By post: Model Engineer & Workshop,
Kelsey Media Ltd, Media Centre,
Morton Way, Horncastle, Lincs LN9 6JR.
Telephone: 01959 541444
Email: neil.wyatt@kelsey.co.uk
©2026 Kelsey Media Ltd.
ISSN: 0033-8923

CUSTOMER SERVICES

General Queries & Back Issues
Email: cs@kelsey.co.uk
Telephone: 01507 529529
Mon-Fri: 8.30am-5.00pm

ADVERTISING

Group Advertising Manager
Sue Keily
Email: sue.keily@kelsey.co.uk
Telephone: 01507 529361

Advertising Sales

Fiona Leak
Email: fiona.leak@kelsey.co.uk
Telephone: 01507 529573

PUBLISHING

Sales & Distribution Manager: Carl Smith
Publishing Director: Dan Savage
Published by: Kelsey Media Ltd, Media Centre,
Morton Way, Horncastle, Lincs LN9 6JR

SUBSCRIPTIONS

Full subscription rates (see inside for offers):
12 months, 12 issues, inc. post & packing - UK
£71.40. Export rates are also available, see
www.classicmagazines.co.uk for more details.
UK subscriptions are zero-rated for the purpose
of Value Added Tax.

Enquiries: cs@kelsey.co.uk

PRINT AND DISTRIBUTION

Printed by: Acorn Web Offset Ltd,
Normanton, West Yorkshire.
Distribution by: Frontline Distribution Solutions
2 East Poultry Avenue, London, EC1A 9PT

EDITORIAL CONTRIBUTIONS

Accepted photographs and articles
will be paid for upon publication. Items
we cannot use will be returned if
accompanied by a stamped addressed
envelope, and recorded delivery must
clearly state so and enclose sufficient
postage.
In common with practice in other
periodicals, all material is sent or
returned at the contributor's own risk,
and neither Model Engineer & Workshop
Magazine, the editor, the staff, nor Kelsey
Media Ltd can be held responsible for
loss or damage, howsoever caused.

The opinions expressed in ME&W are not
necessarily those of the editor or staff.
This periodical must not, without the
written consent of the publishers, be
given, lent, resold, hired out, or otherwise
disposed of in a mutilated condition
or in any unauthorized cover, by way of
trade, or annexed to or as part of any
publication or advertising, literary or
pictorial matter whatsoever.

Just ask
This issue was published on
21 August 2026
The next issue will be on sale
18 September 2026

K KELSEYmedia

recycle
Where you have finished with
this magazine please recycle it.



SMOKE RINGS

TANKS AS A MODEL ENGINEERING SUBJECT

I'm sure that many readers will have noticed my fascination with tanks.

My Dad took my brothers and I on a first visit to the Tank Museum at Bovington when I was about eight or nine years old, and I've long wanted to go to its annual *Tankfest*. This year I finally managed to visit along with my brothers, and there's a report on the event in this issue.



Dad served in the Royal Engineers in the 1950s, although he was a despatch rider rather than a 'tankie', his many stories took in a range of AFVs including Hobart's 'Funnies' and escorting convoys of Sherman Tanks across Salisbury Plain. The Titan Bridge Layer is the successor to the bridge layer variant of the Churchill AVRE my dad was familiar with. Because they are strategically important, bridgelayers are prime targets for an enemy, so Titan is both heavily protected and surprisingly fast. I suspect the Royal Engineers greatly enjoyed showing off how just how nimble the 63-tonne vehicle is.

As massive examples of engineering, tanks and AFVs share a lot of the appeal of railway locomotives, and are increasing popular subjects for model engineering, but we have rarely covered them in the magazine (an exception being Gerard Dean's massive Tiger tank). In the near future we will be covering the building of a fully engineered Armortek 1:6 scale Sherman tank kit. I hope that readers will find this a subject of interest.



Neil Wyatt
Editor

Neil

EXQUISITE TIMEPIECES IN KIT FORM

Kits 4
CLOCKS

Making Time for you

Introducing the 12 Second Rolling Ball Clock

- Fully machined kit form. No specialist tools required.
- Assembly instructions, screwdriver and clock oil provided.
- No clock building or engineering experience required.
- AVAILABLE NOW. Limited batch of only 25. Half now sold!
- Plain brass or 18K gold plated option.
- FREE upgraded base (worth £99) with every order from this batch.
- Clock featured: 12 Second Rolling Ball Clock plated in 18K gold.

Width: 260mm • Depth: 250mm • Height: 360mm.
Sizes approx. including base and case.

For further details

www.kits4clocks.co.uk e:info@kits4clocks.co.uk

We don't do Tiktok we do do tick tock

FROM
£849

"It is most impressive in all respects... The clock is working perfectly and attracting a lot of attention from all who see it."

B.L. Dundee



WE ARE THE EXCLUSIVE UK DISTRIBUTOR FOR

WABECO

MACHINE MANUFACTURER since 1885



**Made in
Germany**

**5
YEARS
WARRANTY**

*On selected
machines*



Wabeco milling machines
Prices from £3,799.00



Wabeco drilling stands
Prices from £238.00



Wabeco lathes
Prices from £3,795.00

Prices include VAT & Delivery Mainland UK

We offer a complete range of quality, precision machines for the discerning engineer.

Developed and manufactured in Germany, Wabeco products guarantee the highest quality standards. Whether your milling or drilling with Wabeco, you're sure to get the best results possible.

Emco distributes a wide range of machine tools, CNC Machines, Lathes, Mills, Routers and Waterjet cutters for industrial and education use.

Visit **emco.co.uk** to see the full range of new and used machines
or call us on **02392 637 100** for more details.



isel **WABECO**
MACHINE MANUFACTURE SINCE 1885

Emco Education Ltd, Unit 4, Hayling Billy Business Centre, Furniss Way,
Hayling Island, Hampshire, United Kingdom PO11 0ED sales@emco.co.uk

emco
UK DISTRIBUTOR

Contents

9 Tankfest 2026

The Editor visits a spectacular display of heavy engineering.

13 Early Developments in Hydrostatic Transmissions

Mike Tilby takes a closer look at the work of the early SMEE President, Professor Henry Selby Hele-Shaw.

18 Living with a Proxxon Mini-Mill

Graham Meek turns his skills to a beautifully finished upgraded spindle for his milling machine.

21 An Engineer's Day Out – Bolton Museum

Roger Backhouse looks at four fascinating compound stationary mill engines.

30 3D Printing in the Home Workshop

Alan Bryan concludes his examples of the uses of 3D printing with some good-looking Quorn accessories.

36 Fourrunner Mk 2 Oscillating Engine

Peter Stuart describes the port plates and cylinders for this impressive V4 steam engine.

40 Lathework Tips

Paul Tiney shares practical ideas for protecting your lathe from damage and wear.



42 Calliper Conundrum

How do you use a calliper to measure in the limited workspace of a benchtop mill? Derek Spedding shares his solution.

44 A Tangential Flycutter

Robert Walker makes an efficient and easily sharpened flycutter, and shares a method for calculating the all-important machining angles.

48 The BR Standard 2-6-0 Class 4 Standard Engine

Doug Hewson makes a start on the cab for his BR 'Mogul'.

52 The Silver Crest BR Class 1500

Mark Thatcher completes the build of this impressive 5" gauge locomotive kit.

58 Beginner's Workshop

How you can use sub-faceplates to simplify some otherwise difficult machining tasks.

59 Improvements to a Pannier Tank

Gerald Martin explains how to add more 'super detailing' to his 3 1/2" gauge design.

65 WIN A PAIR OF TICKETS TO MME 2026 IN OUR FREE COMPETITION

See page 65 for details of how to win one of five pairs of tickets to the Midlands Model Engineering show in October!

68 An Air Powered Hand Engraver

Mitch Barnes makes a start on modifying an inexpensive air compressor to drive the engraver.

74 The South West Miniature Engineering Show

John Arrowsmith concludes his report on this exciting new model engineering event.



Subscribe today!

Get your favourite magazine for less – delivered to your door!

See pages 32-33 for details!

Regulars

3 Smoke Rings

The Editor reflects on tanks as model engineering subjects.

28 Postbag

Our regular pages full of readers' feedback and comment from around the world. Send the Editor your letters at neil.wyatt@kelsey.co.uk.

46 Readers' Tips

Our tip this month shows that even a quick and simple idea can win. Send us your tip, and you could win a prize.

63 On the Wire

Events and news from the world of hobby and full-size engineering.

67 Club Diary

Club Secretaries! It's time to start sending us your 2027 events.

77 Club News

Geoff Theasby's monthly report with news from engineering clubs across the country. Send Geoff your newsletter at geofftheasby@gmail.com.

80 Readers' Classifieds

Another great selection, plus check the wanted ads you may have something another reader needs. If you have something to sell, email us the details or use the form in this issue, to neil.wyatt@kelsey.co.uk.

Visit our Website

www.model-engineer.co.uk

Why not follow us on Twitter? twitter.com/ModelEngineers hashtag #MEW

Extra Content!

There's lots of extra content to be found online to support past articles in Model Engineer & Workshop.

Visit the www.model-engineer.co.uk forum

You can see more of Mark Thatcher's final assembly of the GWR 1500 on his MadForSteam YouTube channel here:



Hot topics on the forum include:

Roughing End Mills – started by Colin Teasdale
Some useful discussion of the merits and usefulness of budget end mills.

J style indicator holders – started by Bob Blackshaw.
Have you tried this design of indicator holder?

Why righthand threads? – started by vibntageengineer
What might have been a simple question ends up with Henry Maudslay.

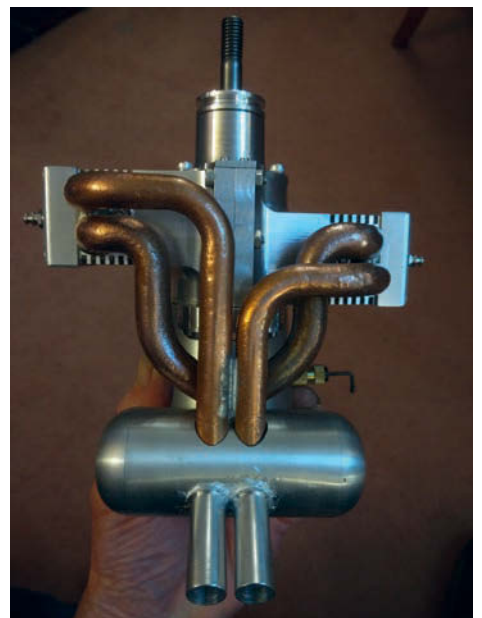
Come and have a Chat! As well as plenty of engineering and hobby related discussion, we are happy for forum members to use it to share advice and support. Come and join us – it's free to all readers!

On the Cover



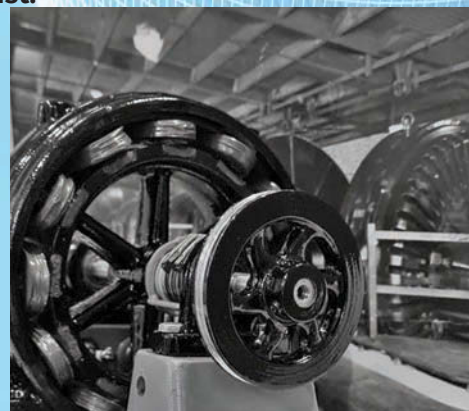
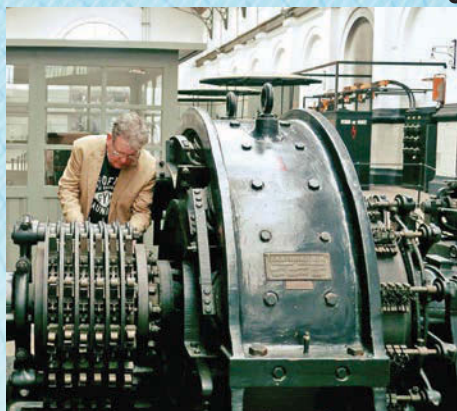
Our cover features **Megatron** at Tankfest 2026. The Challenger 2 TES (Theatre Entry Standard) experimental and trial variant of the British Army's main battle tank, uniquely optimized for intense urban combat. Weighing approximately 74 tons, it utilizes heavily upgraded armour, including passive reactive arrays and cage systems designed to survive tandem warheads and IEDs.

Next Issue



In our next issue, Peter Twissell explains how to use electroforming to make impossible to machine shapes.

Newton Tesla (Electric Drives) Ltd have been trading since 1987 supplying high power variable speed drives and electric motors to industry up to 500KW so you can be confident in buying from a well established and competent variable speed drive specialist.



**Approved and tested
by Myford**

Managing director George Newton, originally from the British Steel industry where he worked with 20,000 HP rolling mill drives is also a skilled machinist and uses his own lathes to design and refine speed controllers especially for the Myford ML7 & Super 7

For the Myford ML7, George and his team produce the AV400, a complete 'Plug & go' solution including a new variable speed motor that meets the original Myford motor specification, has the correct 5/8ths shaft diameter and is a direct fit

The 'AV' range is extended with the AV550 & AV750 for the Super 7 lathe giving a choice of 3/4HP & 1HP motor power

Full Torque is available from motor speed 90 - 1,750 RPM

Advanced Vector control for maximum machining performance

Prewired and programmed ready to go

The AV400/550/750 speed controllers have an impressive 10 year warranty for the inverter and 3 years for the motor (Terms and conditions apply)

Over 5,000 units supplied to Myford owners

Speed control solutions also available for other lathes including Bofford, Southbend, Colchester, Raglan etc call or email for details

Technical support available by telephone and email 7 days a week



Newton Tesla (Electric Drives) Ltd.
Warrington Business Park, Long Lane, Warrington
Cheshire WA2 8TX, Tel: 01925 444773

Email: info@newton-tesla.com

Visit <https://www.newton-tesla.com> for more information.

Follow us on Facebook: www.facebook.com/NewtonTeslaLtd



Tankfest 2026

Neil Wyatt visited an impressive display of full-scale engineering at Bovington Tank Museum, in Dorset.



M60A3 Patton main battle tank.

Sponsored by the online multiplayer game 'World of Tanks', Tankfest is a unique opportunity to see a wide range of armoured fighting vehicles being put through their paces on a massive arena.

Unfortunately, despite a very early start, a couple of road blockages meant we missed the opening display of World War 1 tanks, which featured three replica tanks, two Mark IV and a Whippet painted as the famous 'Musical Box'.

Soon after we arrived there were a number of demonstrations of World War 2 tanks in the arena, starting with some of the British 'infantry' tanks, **photo 1**. I had never paid much attention to the US-built Chaffee light tank before, but I was greatly impressed by the sprightly performance of the museum's own example *Hemlock III*, **photo 2**. Other highlights in the areas included a massive Churchill Mk. 3, **photo 3**, an M3 Grant and the 'film star' M4A2E8

WORLD OF TANKS PRESENTS
TANKFEST®



Photo 1: British infantry tanks of ww2, a Valentine Mark IX follows a Matilda II around the arena.



Photo 2: The Chaffee light tank showed an impressive turn of speed.



Photo 4: Now named 'Fury' this Sherman Easy 8 featured in the 2014 movie of the same name.



Photo 6: The Nashorn SPG was an impressive sight.

Sherman Easy-8 *Fury*, **photo 4**. Tiger 131 was not out on show, but will appear at *Tiger Day* later in the year.

One thing I had hoped to see in action was the Weald Museum's 'Black Sea' StuG III assault gun, salvaged from a sunken ship after over 50 years underwater. Unfortunately on the Saturday, it broke a track and subsequent steering issues meant it could not enter the arena but at least I was able to see it close up, **photo 5**. A consolation was the appearance of a recently restored Nashorn self-propelled gun, **photo 6**. Incidentally, the tanks in the arena

were often followed by drones sending live video to a pair of large screens, so even when they were at the far side there was something to watch.

Away from the arena, there was a lot else to see, **photo 7**, covering everything from vintage military motorcycles, **photo 8**, to a tractor, small arms and various memorabilia. There were extensive displays of static tanks, as well as a 'park' with those in the arena displays. This meant I got to see the replica Mark IV tanks, **photo 9**. I enjoyed getting a close up view of the diminutive Matilda 1, **photo 10**. My brother Joe was



Photo 3: Despite its massive weight, the Churchill had an excellent off-road performance.



Photo 5: A broken track meant the Black Sea StuG III was a static exhibit.



Photo 7: Part of the outdoor exhibition area.

particularly taken by the Panzer III and the M2 Stuart, **photos 11** and **12**.

A large and varied 'market' showcased wargaming, **photo 13**, and large-scale model tanks as well as all manner of so-called 'tactical clothing' and a good selection of food stalls with reasonable prices. Other attractions included a stage with regular presentations on topics such as 'The Great War Songbook' and 'The Hunt for Mother' – there is a good chance that the prototype Mk 1 tank is buried somewhere around the Bovington proving grounds. A massive building housing tanks not presently on display



Photo 8: A vintage Royal Enfield WD/CO military motorcycle from approximately 1944.



Photo 9: Replica British Mark IV tank *Deborah II* built for a 2017 Channel 4 documentary series *Guy Martin's WW1 Tank*.



Photo 10: With a crew of two, the Matilda 1 tank has something of a Heath Robinson look.



Photo 11: M2 Stuart *Cisco Kid*, is part of the Bannister Historic Armour Collection. Credit: Josef Wyatt.



Photo 12: The Tank Museum's Panzer III, K1615/7, saw action in North Africa and is believed to have been captured during the Battle of Alam Halfa in 1942. Credit: Josef Wyatt.



Photo 13: An example of tank-based wargaming.

was opened to visitors. I saw the Soviet KV-1 heavy tank rescued from the bottom of the Neva River in 2003 and features winter camouflage applied over its original green paint, **photo 14**. The inscriptions on the turret translate to "From the women of Leningrad to the Front" and "For Leningrad". The signs warn of low-level radioactive contamination inside -from luminous instrument dials.

The early afternoon saw some of the post-war tanks developed in the cold war including the American M60A3 Patton main battle tank, **header photo**. The star of this section was the recently restored FV4005, a British experimental heavy anti-tank vehicle from the 1950s, featuring a massive 183mm gun built on a Centurion tank hull in an absurdly large turret, **photo 15**.

In the afternoon a recreation of a WW2 skirmish included lots of loud pyrotechnics, **photo 16**. Unsurprisingly, the brave tommies saw off a German reconnaissance patrol with a half track and panzer III.

In contrast to the theatrics, a moving moment was when Warrant Officer Class 1 Johnson Beharry VC's Victoria Cross citation was read to the crowd. The video screens showed him



Photo 14: Soviet KV-1 heavy tank in the usually closed 'not on display' building.



Photo 15: The strangely proportioned FV4005 was recently restored by the museum.



Photo 16: We missed the opening set piece recreating a WW1 tank action, this is the WW2 'skirmish' in the afternoon.



Photo 17: The Warrior infantry carrier is surprisingly fast cross country.



Photo 18: The Titan Armoured Bridge Layer can set up a 25 metre bridge in minutes.



Photo 19: The heavily armoured Challenger 2 Megatron closed out the arena demonstrations.

speaking at the opening of Tankfest on Friday, where he was reunited with the Warrior AFV in which he had shown exceptional courage despite severe injuries whilst on service in Afghanistan. We may be fascinated by the machines but must not forget the human cost of war and conflict.

The finale of the day showcased some of the Army's modern tanks and AFVs. This included a demonstration of the Warrior, **photo 17**. Crewed by a commander and driver, it can carry seven to ten infantry troops provide support after their deployment. Warrior

will be replaced by the Boxer series of eight-wheeled vehicles and gave an impressive display of its speed around the arena. The Titan bridge layer was able to deploy (and recover) its 25-meter folding bridge in just a few minutes, **photo 18**.

The climax of the event saw the Challenger 2 TES (Theatre Entry Standard) experimental and trial variant of the British Army's main battle tank, known as *Megatron*, uniquely optimized for intense urban combat, **photo 19**. Weighing approximately 74 tons, it utilizes

heavily upgraded armour, including passive reactive arrays and cage systems designed to survive tandem warheads and IEDs.

Tank Museum and Tankfest are an ideal day out for anyone interested in AFVs and military history. Admission to Tankfest includes the excellent Bovington Museum itself, however as the ticket grants a whole year of free admission to the museum, which makes it good value, we left visiting it for another day. For information on other events at Bovington, please see this month's 'On the Wire'. 🍷

Early Developments In Hydrostatic Transmissions

PART **3**

Mike Tilby of the Society of Model and Experimental Engineers (SMEE) looks at some of the practical aspects of using hydraulic power transmission.

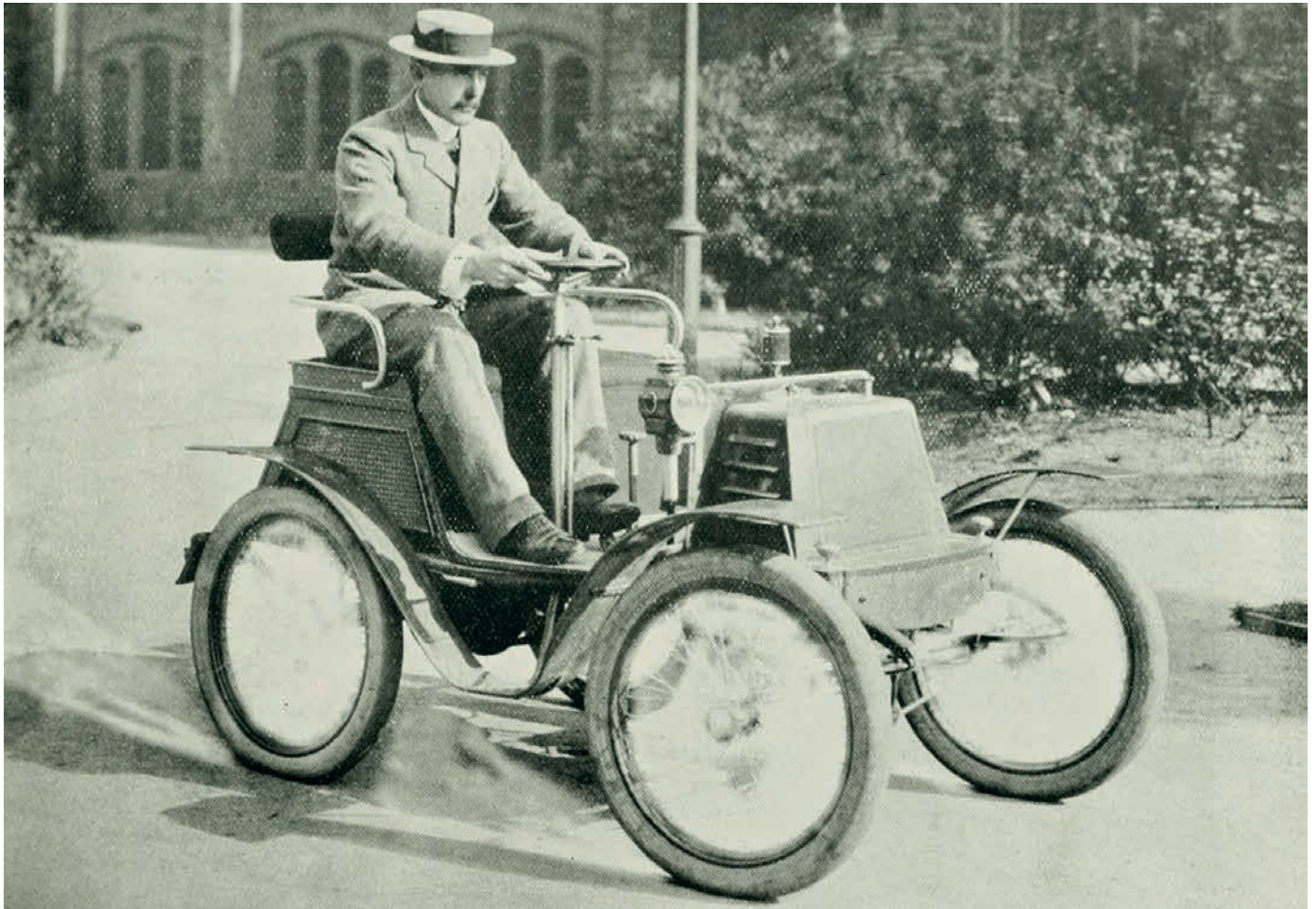


Photo 4: Professor Henry Selby Hele-Shaw, from ref. 12.

The previous part of this series ended by quoting comments made by Professor Hele-Shaw about the Hall 'variable speed apparatus for transmitting power'. As mentioned before, Professor Hele-Shaw was the second President of the Society of Model and Experimental Engineers (SMEE) (1913 - 1914), the first being Percival Marshall. Henry Selby Hele-Shaw, **photo 4**, was the first professor of engineering at Liverpool University and in 1922 was President of the Institute of Mechanical Engineers. He became particularly well known for

his invention of a type of wet multiplate clutch in which the alternating steel and bronze plates were immersed in oil. This type of clutch is used for transmission of high torques and it was manufactured for many years by a company established by Professor Hele-Shaw. It was used in the first cars produced by Aston Martin.

Professor Hele-Shaw published numerous patents including several which described his own 'hydraulic transmission apparatus'. That apparatus underwent a number of improvements as seen in his

succession of patents. The design described here is from his original patent, **ref. 13**, which was awarded in 1908. I've not seen anything to show how widely this type of torque converter was used in road vehicles, but it seems worthy of inclusion here because it is such an ingenious mechanism and it illustrates the importance of minimising fluid flow in order to get maximum efficiency.

Professor Hele-Shaw set up the company Compayne Ltd in order to exploit his inventions related to hydrostatic drives. These were used in

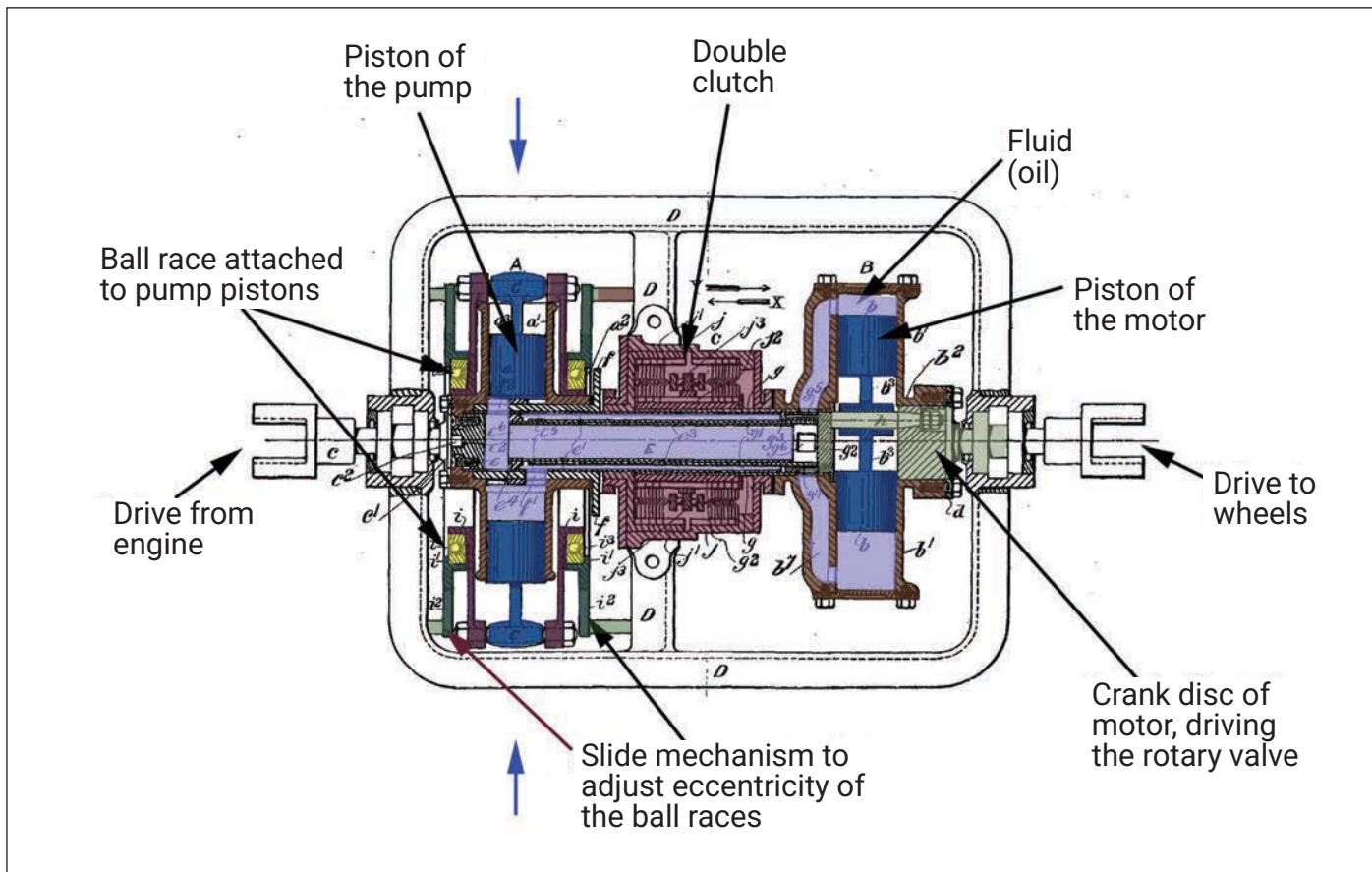


Fig 9: Section through an example of the Hele-Shaw hydraulic transmission apparatus. Blue arrows indicate the position of the section drawn in fig. 10, adapted from ref. 13.)

at least one type of railway vehicle (see below) and for transmission of power to steering gear on a number of ships.

THE HELE-SHAW HYDRAULIC TRANSMISSION APPARATUS

The Hele-Shaw design consisted of a hydraulic pump and motor which were both based on radial cylinders and so it was superficially similar to Mr Hall's apparatus described in part two of this series. However, most aspects of the operating principles were very different to Mr Hall's. The Hele-Shaw patents covered various options for design of the pump and motor but in the example illustrated the pump (on the left in **fig. 9**) had pistons acting against a ring, similar in principle to Mr Rigg's motor (see part 2). However, in the Hele-Shaw design, the ring is actually a ball race of relatively small diameter that is connected to the piston rod ends which lie on a larger radius.

In the other half of the apparatus the pistons of the motor act on a central crank. This resembles the motor in Mr Hall's apparatus except the stroke was not adjustable. Instead, the stroke of the pump could be adjusted continuously between

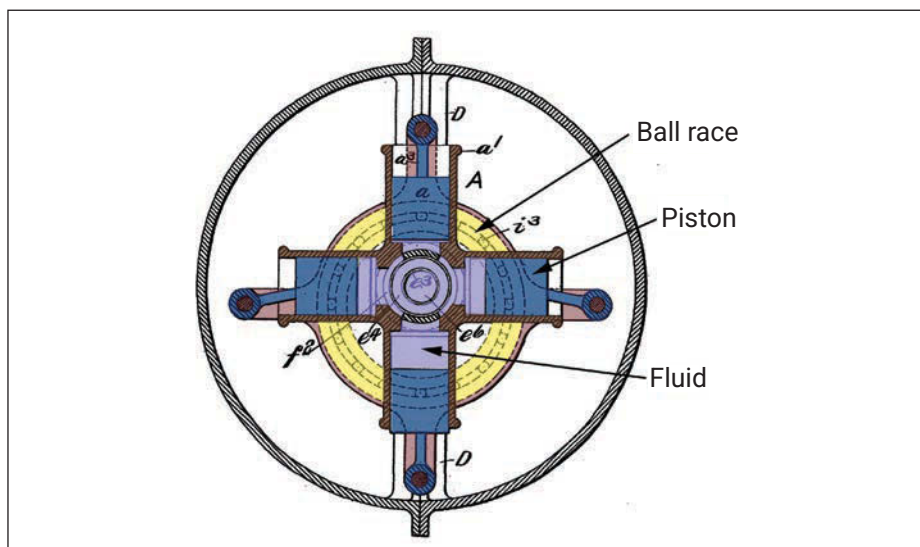


Fig 10: Section across the Hele-Shaw hydraulic transmission apparatus shown in fig. 9 at the location indicated by the blue arrows, adapted from ref. 13.

zero and maximum by changing the offset of the ring which governed the movement of the piston rods relative to the central axis of the cylinders (see **fig. 10**). This is the same as in Mr Rigg's hydraulic motor.

A key feature was that the direction of fluid flow produced by the pump could be reversed by changing the position of the central sleeve valve

and this reversed direction of the hydraulic motor.

OPERATION OF THE HELE-SHAW APPARATUS

As shown in fig. 9, the cylinders of the pump were attached to and revolved with the input shaft which was connected to the vehicle's engine.

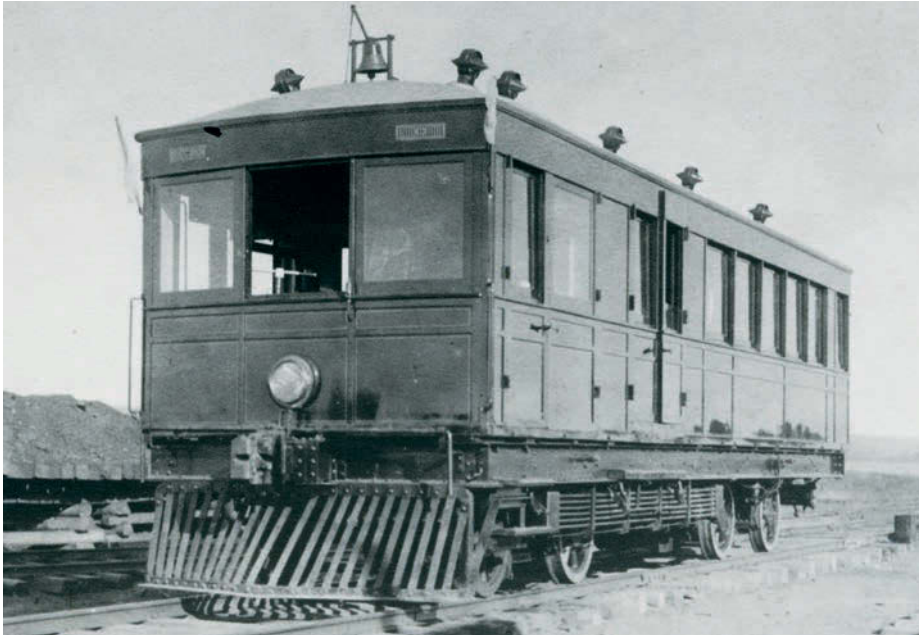


Photo 5: Petrol - hydraulic rail coach on the Lacombe and Blindman Valley railway in 1914. (Photo: Public domain in Alberta Red Deer Archives P12785).

The cylinders of the hydraulic motor were connected to the output shaft of the apparatus.

The frame that held the main ball races of the pump in the desired off-set position was attached to the chassis and so could not rotate. Between the pump and the motor was a three-position Hele-Shaw type friction plate clutch mechanism. In the middle position the crank shaft of the hydraulic motor was un-clutched. In the second position the motor crank shaft was clutched to the revolving cylinders of the pump. In the third position it was clutched to the clutch casing which was fixed to the chassis. Thus this acted as a brake. The apparatus was operated in the following four modes:

1 – Idling. In this condition the three-position clutch was in mid position, so the hydraulic motor was de-clutched from both the pump and the chassis. Rotation of the input shaft caused the cylinders and pistons of the pump to rotate relative to the eccentric ball races. Depending on the degree of eccentricity of the ball races relative to the main axis, fluid was pumped to the motor where it simply caused the crank shaft to rotate idly in its bearings.

2 – Slow forwards movement. The crank shaft of the hydraulic motor was clutched to the chassis (i.e. a brake was applied to it) thereby preventing its rotation relative to the chassis. This resulted in the pressure in the fluid rising until either the IC engine stalled or the cylinders of the motor, and hence the output shaft, were forced to rotate. Stalling of the engine could be prevented by reducing the eccentricity of the ball races of the

motor, thereby reducing the stroke of the pistons and allowing generation of higher pressure in the fluid. This resulted in higher torque and lower rpm of the output shaft.

In this mode of operation fluid flow rate and hence frictional losses were reduced when operating at slow speeds, so this mode of operation gave lowest efficiency at high speeds.

3 – Reverse movement. The valve of the pump was changed so as to reverse the direction of fluid flow. This caused the motor to rotate in the reverse direction.

4 – Fast forwards movement. With the pump valve still set for reverse flow, the clutch position was changed so the motor crankshaft was unclutched from the chassis (i.e. the brake was released) and was clutched to the rotating pump cylinders and hence to the input shaft. In this state, the pump continued to send pressurised fluid to the motor and the motor cylinders continued to rotate in the reverse direction relative to the motor crankshaft. However, that crankshaft was itself now rotating at the same speed as the input shaft. If the pump and motor had equal numbers of cylinders of the same diameter and if their strokes were set to be equal, (i.e. eccentricity of the pump ball races was equal to the throw of motor's crank) then the motor cylinders rotated at the same speed as the pump cylinders but in the opposite direction. This means that the motor cylinders were stationary relative to the chassis and so the vehicle was stationary.

Next, the stroke of the pump was reduced by adjusting the eccentricity

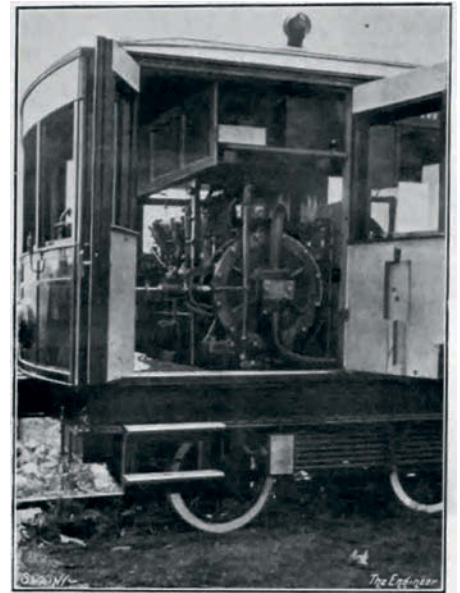


Photo 6: Driver's compartment showing end of the hydraulic pump, from ref. 14.

of the ball races. This caused the reverse rotation of the motor cylinders relative to its crankshaft to slow down. The reverse rotation of the motor cylinders, and hence of the output shaft, was then slower than the forward rotation of the crankshaft and so they rotated slowly in the forwards direction. If the stroke of the pump was reduced further the output shaft speeded up until, with zero pump stroke, it became locked to the speed of the input shaft from the engine.

In this mode of operation fluid flow rate and hence frictional losses were reduced when operating at high speeds, so this mode of operation gave highest efficiency at high speeds and became equivalent to Mr Hall's apparatus (see part 2).

In later patents by Professor Hele-Shaw, hydraulic motors were positioned remotely from the pump. For example, a hydraulic motor was placed in the hub of each rear wheel of the vehicle. The speed and direction of rotation of the motors was determined by the speed and direction at which the fluid was pumped. A comparable arrangement was used in a number of ships where a central Hele-Shaw pump was used to drive capstans etc at various remote locations.

PETROL - HYDRAULIC RAILWAY MOTOR COACH

The beginning of the last century saw many companies exploring ways to adapt internal combustion engines to power railway vehicles. A major question was how best to match the

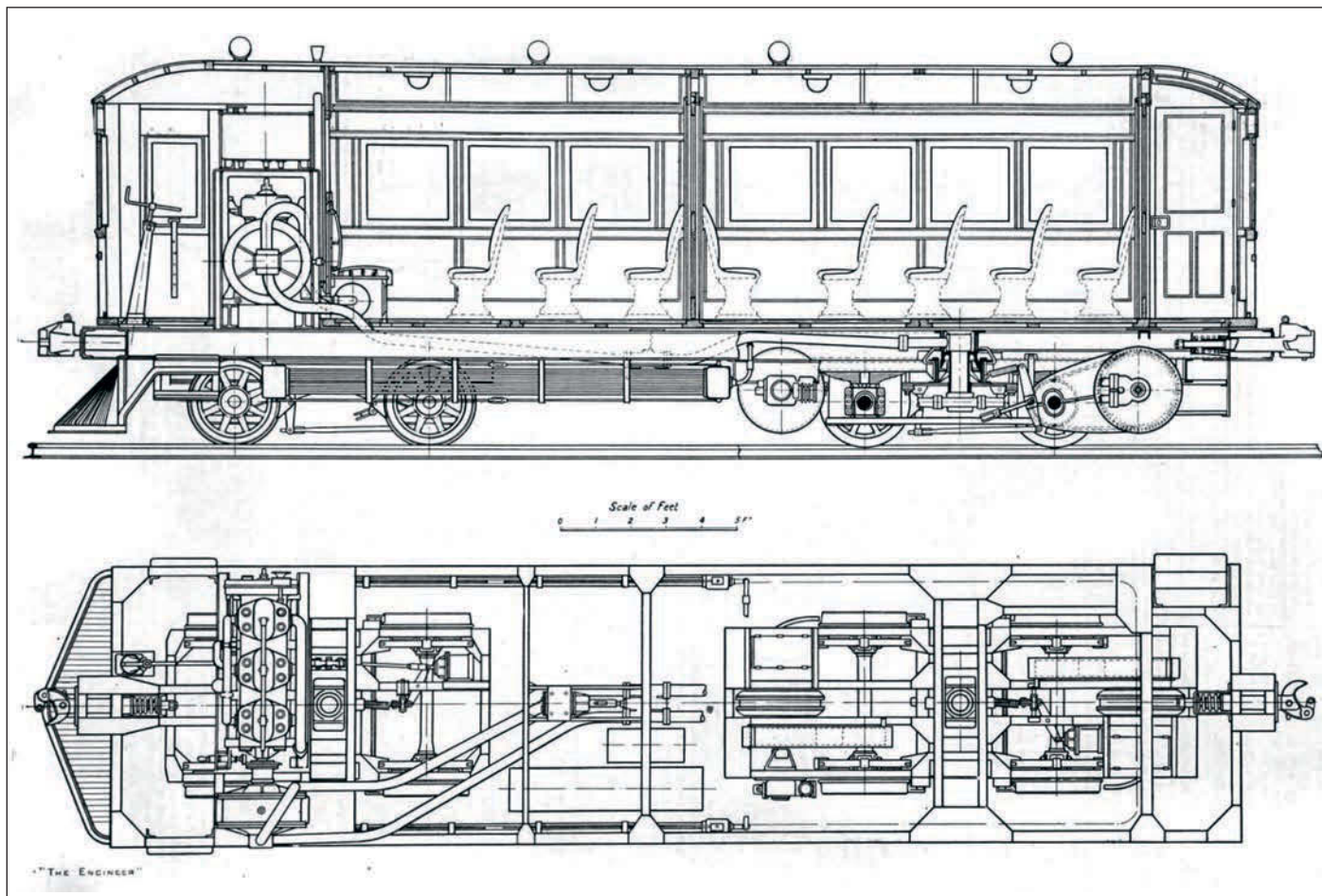


Fig 11: Petrol - hydraulic rail coach built by Messrs McEwan Pratt and Company, 1913, from ref. 14.

engine rpm to the varied requirements for wheel rpm. The situation was summarised in **ref. 14** "For such work as is met with on railways with vehicles weighing something like 20 tons the gear-box requires to be exceptionally heavy and cumbersome, while the frequent operation of the powerful clutch is somewhat trying to the attendant".

As described in later instalments, several of the attempts to adapt IC engines to rail involved the use of hydrostatic transmissions of various designs. One of the earliest such ventures was made in 1913 by Messrs McEwan Pratt and Company which had been founded in Wickford, Essex. However, by 1913, it had become a subsidiary of the firm of Baguley Cars Ltd, of Burton on Trent. Baguley later built a number of narrow-gauge locomotives. The rail vehicle to be described here was a standard gauge motor coach for service in Canada, **photo 5**. It weighed 20 tons, its length was 33.ft and it was powered by a six-cylinder engine that was estimated to develop 103.bhp running on petrol or 85 bhp on paraffin. The engine powered a Hele-Shaw pump which can be seen in **figs. 11** and **12** and in **photo 6**. The pump delivered oil at up

to 2,000 psi to two motors mounted on the rear bogie. These drove the axles via 'heavy chain gearing'. The two substantial pipes that carried the oil to the rear bogie can be seen in fig. 11 and photo 6. It was reported that the car could be started, stopped and reversed with ease by the manipulation of a hand wheel which adjusted the throw of the pump and the direction of flow. The hydraulic drive provided great starting effort and, with about thirty people on board, the car coped easily with gradients of 1 in 50. The coach was delivered to the newly established Lacombe and Blindman Valley Railway in Alberta. The line was taken over by the Canadian Pacific Railway in 1928 and the coach was scrapped, **ref. 15**.

To be continued

REFERENCES

12. Anon. (1902) *Page's Magazine*, 2(2) August: p 181
13. Hele-Shaw, H.S. (1908), *Improvements in and connected with hydraulic transmission of power*. UK Patent No 11,723/ A.D.1908
14. Anon. (1913), Petrol - hydraulic railway motor coach. *The Engineer*, 8 April: 154 - 156. Available at: www.gracesguide.co.uk/Main_Page

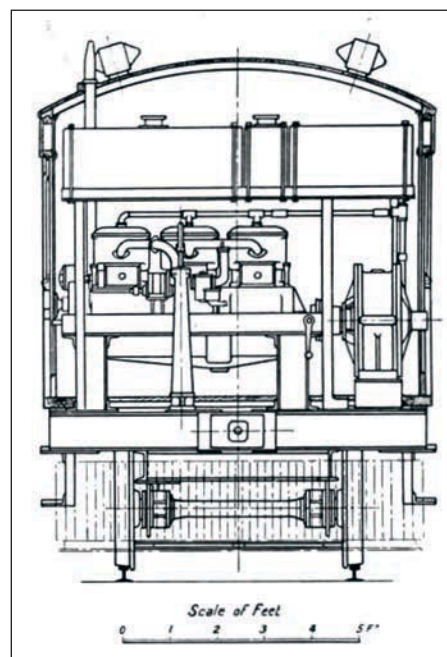


Fig 12: Section across driver's compartment showing the engine and hydraulic pump, from ref. 14.

15. Schneider, E. (1987), The Peanut Line. *Canadian Rail* No. 398 (May-June): 76 - 85. www.exporail.org/canrail/canadian_rail_1962_1989/canadian-rail-398-1987.pdf

The Melbourne Society of Model & Experimental Engineers presents our

100TH YEAR CELEBRATION 2026



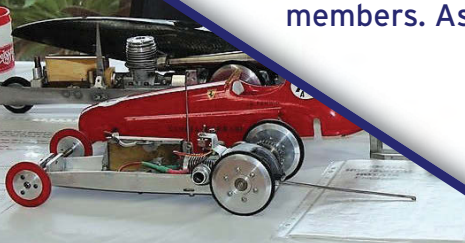
SATURDAY 3RD - SUNDAY 4TH OCTOBER 2026

SOUTH OAKLEIGH COLLEGE, BAKERS RD, SOUTH OAKLEIGH, VICTORIA, AUSTRALIA

This year we invite you all in celebrating Melbourne Society of Model & Experimental Engineers Centenary 100th Anniversary! To mark such a historic event, our exhibition will be hosted over two full days, back to back. We hope to see you there.

Use our website to get in touch if you'd like to exhibit models from past club or family members. As for our centenary, we hope to feature earlier work alongside today's latest creations.

To keep up to date with further information, visit our website or Model Engineer & Workshop's website.



At this time, we would also like to recognise and celebrate 51 years for the Australian Antiquarian Horological Society and 42 years for the Melbourne Meccano Club Inc.





The new spindle.

Living with a Proxxon Mini-Mill - A New Spindle

In the first of a few occasional articles, **Graham Meek** explains how he fitted a new ER20 spindle to his Proxxon mill.

The standard spindle on the Proxxon FF 230 Milling Machine, **photo 1**, uses a collet arrangement which is usually found on woodworking portable routers. The size of collets supplied with the machine are 6, 8 and 10mm. The 8mm collet is a bit of an oddball when it comes to engineering as most cutters are 6 and 10mm shanks. I spent some time trying to source this particular type of collet in different sizes, which did not break the bank with little success. It was finally decided to change the spindle to accept ER 20 collets, **photo 2**. These collets come in both Imperial and Metric sizes and each collet has a gripping range of up to 1mm, (smaller sizes are 0.5mm gripping range).

Using the ER 20 collets means that cutters with a 12mm shank can now be used on the mill. This gives a maximum endmill size of 14mm diameter. Thus the redesign of the spindle, **fig. 1**, was started to accept these collets. It was

also decided at this time to incorporate a bayonet fitting to accept tooling with the same general external form of the collet, but which was dedicated to a particular tool. Tools like the drill chuck, shell mill holder, slitting saw arbour and mini boring and facing head. Mounting directly into the taper avoids the undue overhang when fitting such tooling in collets. The little Proxxon is not blessed with a lot of daylight under the spindle nose. Thus anything which keeps overhang to a minimum also increases the size of work that can be accommodated.

One thing that struck me as not being a very good idea was the use of a single M3 grub screw to lock the drive pulley for bearing adjustment. If the owner does not know this grub screw is there, it can make a mess of the pulley mounting thread on the existing spindle, (should this spindle ever be needed at a later date). In the new design a circular nut with two spanner flats is used for the bearing



The Proxxon mill with various tooling.

original, and as such needs a 1mm thick spacer to make up the difference in the quill housing. This increase in the front bearing does allow the spindle to be increased to 14mm diameter between the two bearings, thus making it more rigid.

After two years of usage the new bearing does not show any signs of deterioration. In an ideal world it would have been nice to fit two such bearings at the spindle nose. However the existing Proxxon design would not permit this as the two slots which maintain quill orientation and limit the quill travel finish just above the original ball bearing bore.

Short of making a new quill and the work this entails it was decided to stick with a single bearing arrangement. Replacing the bearing if, or when it should fail.

Apart from maintaining the concentricity of the collet location taper to the bearing registers most of the work on the spindle is pretty straightforward. The two threads will need to be screwcut as concentricity and squareness are important. More so on the pulley attachment and bearing adjustment thread. As any out of squareness here will directly affect the bearing's life expectancy. The spindle

nose thread also needs to be square, otherwise the bayonet might only lock on one side of the arbor. Fortunately the pitch of the threads is the same so it will only mean one screwcutting train to set up.

The material used was EN24T, but this could be substituted for silver steel or O1 tool steel. The choice of material was done on the basis of longevity due to wear resistance and high tensile properties. Given the amount of cutter changes etc. that have occurred in the past two years the spindle shows no signs of wear. Just a slight burnishing of the thread and collet taper.

The arbors for the various additional tooling mentioned earlier were also made from EN24T as was the bayonet nut. The thread for this last item was also screwcut, as an M24 x 1mm pitch thread is not one which most readers carry a tap for. These will be detailed in a later article.

The assembly is basically a reversal of dismantling except that the bearing adjustment is now carried out separately, and that the nut now carries two M4 locking grub screws. These are provided with Delrin protection pieces to avoid damaging the spindle thread. Two grub screws are used to avoid any

tendency for the nut to tip during the tightening of a single M4 grub screw, something which did happen with the original Proxxon set-up. There is nothing to be gained from pre-loading these bearings. The removal of any end play is all that is required. A thin spanner will be required to hold this nut when tightening the pulley.

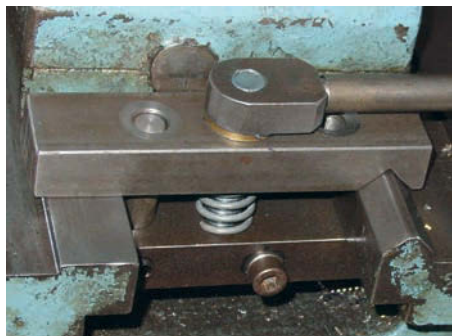
There was one further thing I was not happy with concerning the original Proxxon quill design. Two M5 grub screws are used to align and control the quill during drilling operations. The crests of the M5 threads form the sliding surface for the slot in the quill to slide over. After a few movements the slot sides resemble a furrowed field. This was not considered good engineering. It may make for a cheap manufacturing solution but there is a better way for the home machinist. Thus my next article will cover the manufacture and fitment of some special screws to counter the furrowed field problem. As well as stopping the motor trying to turn the belt housing about the spindle when starting the motor with the quill unlocked, as the new pins are a better fit in the slot everything moves much more smoothly.

To be continued

Look out for your next issue of **Model Engineer & Workshop**

**Number 4781
October 2026**

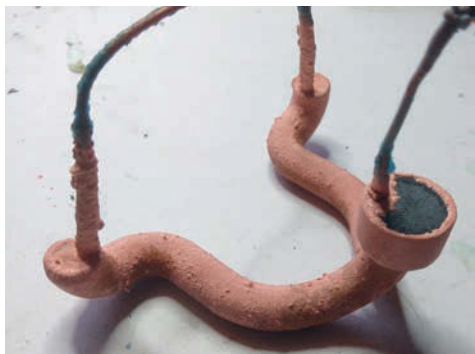
On sale
**September 18
2026**



Jaques Maurel shares an unusual design for a tailstock lock suitable for many types of lathe.



John Arrowsmith reports on the 2026 Sweet Pea Rally.



Pete Twissel explains how to make complex-shaped parts using electroforming.



To pre-order your next copy of ME&W visit www.classicmagazines.co.uk or call **01507 529 529**

Bolton Steam Museum

Roger Backhouse looks at a quartet of compounds at the UK's largest collection of stationary steam engines.

PART 2



There's plenty to see at this excellent volunteer-run museum. After previously describing some of the larger engines, including two much altered beam engines, it is time to look at other 'big boys' in the collection, compound engines of different types.

KENYON VERTICAL CROSS COMPOUND

One of the largest engines in the museum this vertical cross compound is believed to be unique. The term cross compound refers to the high and low pressure cylinders being next to each other, **photo 15**.

Like some others at Bolton early history remains unknown. Around 1900 it was rebuilt for Dearnside Mills Denby Dale, near Huddersfield, from parts of an earlier engine. This mill made various woollen and worsted cloths and latterly specialised in worsted suitings. The engine was saved in 1977 when the mill closed but it wasn't re-erected at Bolton until 2008.

James Lumb and Sons of Elland had rebuilt the engine which incorporates a special valve patented by James Lumb. However, the mill's managing director William Henry Kenyon was himself an engineer and inventor and was probably the guiding mind behind the work.

In order to improve economy when the engine was working under part load slide valve engines like this had a supplementary valve on the back of the



Photo 15: This engine was rebuilt by James Lumb and Sons around 1900 for William Kenyon's Dearnside Mill at Denby Dale near Huddersfield . It incorporates parts from earlier engines of which nothing is known.

main slide valve. This could vary the point in the stroke when the supply of steam from the boiler was shut off. The Meyer valve was something similar but driven by a separate eccentric.

The key feature of James Lumb's patent is that it used a trip system controlled by an unusual governor design that could snap back the

supplementary valve quickly to close the steam stream at a particular point during the stroke. Here is the last surviving example of this type of valve. Thankfully it proved highly reliable in service. Rapid valve closing was known to be important for economical working, a feature of the Corliss valve used on most mill engines.



Photo 16: The flywheel pulley drove mill machinery via a leather belt to line shafts.

Two cylinders of 14" and 26" diameter and 3' stroke drive two cranks set at 180° set on each side of the 14' diameter flywheel driving mill machinery with two leather belts running on the flywheel rim. Belt or rope drive to overhead line shafts was usual in mills, **photo 16**.

Another advantage of the Corliss and Lumb valves, to be discussed later, is that they helped to keep the speed of the engine constant. That was important in textile mills where 'hunting' (small variations of the speed around the mean) caused problems for spinners and weavers.

This engine has a much-altered version of Watt's parallel motion, with long links that guide the piston rod to move vertically, thus avoiding the need for a machined cross head and guides. This version was invented by one Phineas Crowther around 1800 and used on many North East colliery winding engines though rarely used elsewhere. That may be another sign this was an old engine before it came to Denby Dale, **photo 17**.

DIAMOND ROPE WORKS ENGINE

One engine type lacking in this museum is a marine-type triple expansion engine though some were used in textile mills. As they took up less space than horizontal engines and needed smaller engine houses it is surprising that not more were used.

The nearest the museum has to that type is a two-cylinder inverted



Photo 17: Rather than use crossheads and slides to guide the piston rod the Kenyon engine uses an adaptation of Watt's parallel motion devised by Phineas Crowther in the North East that was much used for colliery winding engines.



Photo 19: Advertisement for one of Scott and Hodgson's triple expansion engines. These were much used in ships but some found their way to cotton mills as they took up less space than the horizontal engines generally used.

vertical compound with cylinders at the top and the crankshaft below, **photo 18**. At first glance it looks like a triple expansion type and the makers, Scott and Hodgson of Guide Bridge, advertised such engines among their products, **photo 19**.

It came from the Diamond Rope Works near Oldham owned by Hardman, Ingham and Dawson who made ropes and twine. One of their products was cotton ropes, much used in textile mills to take drive from the engine to line shafts on floors above, **photo 20**. When the mill expanded in 1914 this new engine was built by and



Photo 18: The two cylinder vertical compound built by Scott and Hodgson of Guide Bridge for the Diamond Rope Works around 1914-15.



Photo 20: Advertisement for the Diamond rope works. One of their products, cotton rope, was much used in cotton mills to drive line shafts. Cotton rope was strong and quiet in operation.

named *Lily*. It kept working until a mill fire in 1975, a good record of service.

Museum volunteers did not acquire this engine until 1995 just after the mill was demolished. Moving it was a problem and through no fault of the volunteers the cast iron base was damaged during removal, and it had to be metal stitched. When re-erected it required 30 tons of concrete poured to make the foundations.

The high-pressure cylinder is of 14" diameter and the low pressure 30" diameter. The stroke was 30" and it could develop 250 indicated horsepower. As was common practice



Photo 21: Diamond rope works engine seen from the side showing the beam operated condensate pump.

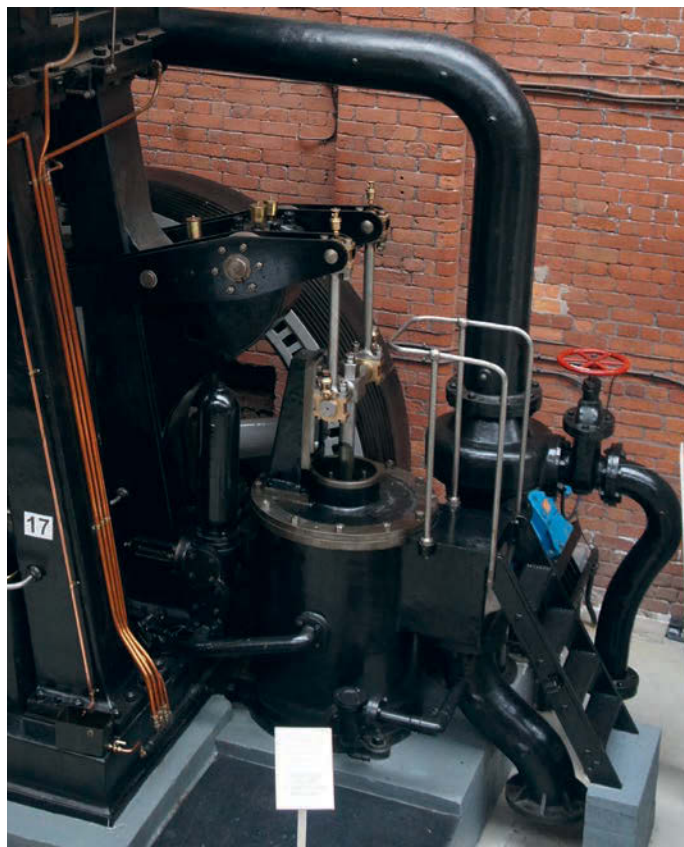


Photo 22: The condensate pump once pumped condensed steam from the adjacent condenser to the cooling pond. This is no longer possible at the museum. Vacuum in the condenser helped power mill engines as well as steam pressure.



Photo 23: Twin cylinder Robey compound was built for demonstration and experimental purposes in a college.

the high-pressure cylinder was fitted with Corliss valves and the low pressure with a piston valve. An unusual feature is that besides the main governor the engine was fitted with a smaller secondary governor. If a rope broke on the flywheel the engine

might speed up and the governor linked to a Tate unit to cut off steam automatically.

The large cylinder on the engine is a pump that once removed condensed steam and cooling water from the adjacent condenser, **photo 21**.

Most stationary steam engines had condensers but since the museum has no cooling pond for the condenser water, there isn't one fitted, **photo 22**.

When the engine was rebuilt in the museum it was found that a 5' eccentric rod was bent. It was straightened in the late Fred Dibnah's blacksmith's forge. (Visitors can see one of Fred Dibnah's engines on loan to the collection).

ROBEY CROSS COMPOUND

The engine was made by Robey's of Lincoln as a latecomer to the stationary steam engine scene in 1935 and is a smaller version of this type often made for textile mills. Robey's had a reputation for forward thinking, **photo 23**. This museum example was used for experimental and teaching purposes in the Manchester College of Technology (later UMIST) where it remained until 1947. Currently it is owned by a member of the Northern Mill Engine Society and is on loan to the Steam Museum. Another engine made by William Sisson of Gloucester was also used in a college to train students and will feature in a future article.

Family history and mill engines.

Many *Model Engineer* readers had family members in textile and engineering industries. My family history connection is through my grandfather, Thomas Sydney Backhouse. Born in 1896 he was appointed engineer to the Ashton Weaving Co at their Alma Bridge weaving mill in Ashton under Lyme in 1922. He reported directly to the managing director and was solely responsible for running and maintaining plant and machinery, managing a team of eight men. The mill had 1,000 plain and Jacquard looms. If grandfather failed in his work the mill came to a stop or reduced production.

His 1943 application to join the Institution of Mechanical Engineers gave a full account of his working life including his time at Barrow-in-Furness during the First World War where he was a millwright working for Vickers on diesel submarines. It's believed he did test dives, but family never knew the full story.

Unfortunately, little is known about grandfather's mill engines except that they were of 500 ihp and 50 ihp; presumably the smaller was a barring engine. My father remembered riding on the connecting rods, a somewhat risky practice, so it was a horizontal engine. The engine was probably a tandem compound, the commonest type of cotton mill engine so I particularly liked seeing the Wasp mill engine at Bolton. He described grandfather's engine as a 'Heinz' engine (remember 57 Varieties?), altered during its working life, possibly changed from simple expansion to a tandem compound. If any reader has information about this engine, I'd be pleased to hear more.

The mill remained gas lit until closure and a device was fitted that dimmed the gas supply five minutes before work ceased giving operatives warning to stop their looms. The gas supply then reduced further giving workers just enough time to leave the mill! Whether this was commonplace I do not know.

Once steeplejacks came to repair the chimney and grandfather decided to climb to the top. He said the chimney swayed in the wind. Grandfather also had to inspect the Lancashire boilers crawling in through the mudhole with a flare lamp for lighting, most unpleasant.

The mill closed in 1932. Experiments weaving rayon could not keep it going. Grandfather was then unemployed, but years of study at evening classes helped him into teaching handicrafts and mathematics, becoming vice principal of Corby Technical College.

Others were unemployed for years. William Woodruff's book *The road to Nab End* is a moving account of how his family were hit by the cotton industry depression in Blackburn.

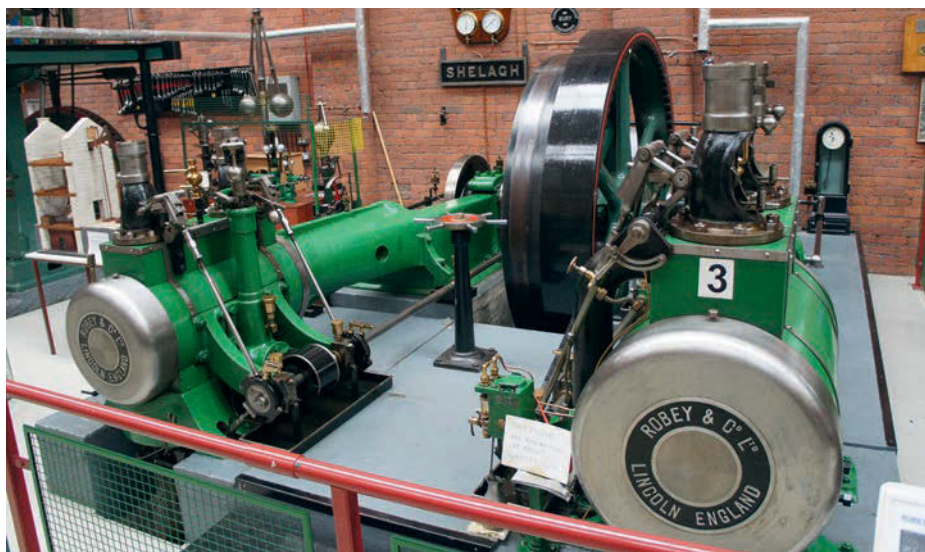


Photo 24: This Robey engine was a latecomer to the steam engine scene. Built in 1935 it remained at Manchester College of Technology until 1947.

The high- and low-pressure cylinders are side by side with the flywheel between them. A Petrie engine of similar arrangement can be seen at New Lanark, Scotland, **photo 24**. The high pressure cylinder was 8.5" diameter and the low pressure 16" diameter, with a 22" stroke. Cranks are set at 90° so that four power strokes took place every revolution making the engine smooth running. There are drop valves on the inlet and exhaust.

Alongside the flywheel is a pulley where a band brake was fitted to measure torque and hence the power achieved. Power output was 80 indicated horsepower at 120rpm. The engine is set

up to show taking an indicator diagram. Such measurements were vital to ensure efficient operation, **photo 25**.

ELSIE - THE WASP MILL ENGINE

Mill engines often had names, usually from owner's family members. *Elsie* is a classic northern mill tandem compound engine with high- and low-pressure cylinders in line with pistons on the same piston rod to the connecting rod and crankshaft. There were hundreds built, **photo 26**.

The engine was built in 1902 by J & W McNaught of Rochdale for the



Photo 25: Taking an indicator diagram was an essential part of a mill engineer's work. A diagram would show if the engine was working efficiently. It is hoped to feature more about indicators in a future article.

Barchant Spinning Company but was moved in 1917 to Wasp Mill at Wardle near Rochdale making wool flannel. (Many mills had short names. With the sophistication of capitalist enterprises everything was carefully costed. Longer names meant using

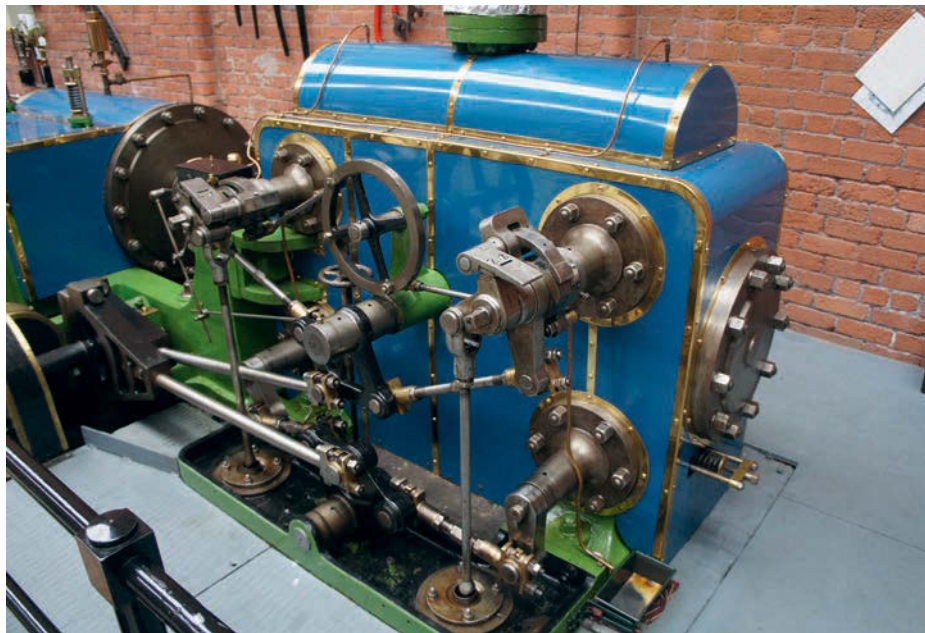


Photo 26: The Wasp Mill engine high pressure cylinder is fitted with Corliss valves which open and shut very quickly helping to keep the engine running at a steady speed, important in textile manufacturing,



Photo 27: Wasp engine crankshaft and flywheel. Ropes from the flywheel pulley operated line shafts powering machinery in the mill.

more paint!) The engine worked there until 1967 when it was saved for the Steam Museum. Removal was helped by a local Territorial Army Royal Engineer's company.

The high-pressure cylinder was of 13" diameter controlled by Corliss valves, **photo 27**. Like the low pressure it had a 36" stroke. The 24" diameter low pressure cylinder is understood to have used slide valves. The condenser and air pump are fitted correctly underneath the engine, but again they cannot be used in the museum due to a lack of water supply.

The flywheel weighs 8 tons and has a diameter of 12'. It drove machinery via 1.5" diameter cotton ropes from the flywheel to line shafts, **photo 28**. Rope drives became near universal after 1880 as they were quiet in operation and lasted well. An exception is Queen Street Mill near Burnley which used geared drive, **photo 29**.

The governor is an unusual cross arm design, **photo 30**. John Hannavy, (author of *The Governor - controlling the power of steam engines*. Pen and Sword. 2021) has found only two other examples. He asks if it was designed



Photo 28: Crankshaft bearing and lubricators. Mill engines needed regular oiling at many points.



Photo 29: The cross-arm governor is an unusual design, one of just three known examples.

and built in house by J & W McNaught themselves.

OTHER MILL ENGINES

Some other classic mill engine designs include the huge Trencherfield Mill at Wigan Pier, open occasionally, the Museum of Science and Technology in Manchester, Bancroft Mill Barnoldswick, Queen Street Mill Burnley, Leeds Industrial Museum and Ellenroad Engine, Milnrow, near Rochdale.

To be continued

GET ONE YEAR OF MODEL ENGINEER & WORKSHOP FOR JUST £57.99



REASONS TO SUBSCRIBE

- 1 Models illustrated with plans and photos
- 2 Tools and equipment for your workshop
- 3 Reports on hobby engineering events
- 4 Hints, tips, ideas and advice



Scan
me

EASY WAYS TO SUBSCRIBE

1. GO TO **CLASSICMAGAZINES.CO.UK/MEW2026**
2. CALL US **01507 529529** QUOTE **MEW2026**
3. USE THIS **QR CODE** TO GO DIRECTLY TO OUR WEBSITE

Lines open Monday-Friday, 8:30am-5:00pm. Calls charged at your standard network rate.

Terms & Conditions: UK Direct Debit, you will pay £57.99 for 12 issues, then £57.99 annually thereafter. Savings based on the standard price per issue for 12 issues. Offer ends December 31, 2026. Your subscription will start with the next available issue and you will receive 12 issues in a year. For full terms and conditions visit shop.kelsey.co.uk/terms-and-conditions : We take great care in handling your personal details and these will only ever be used as set out in our private policy which can be viewed at shop.kelsey.co.uk/privacy-policy. You may unsubscribe at any time.

SAVE £££s ON THIS WEEK'S


**PRICE
CRASH**

SEE ONLINE FOR LATEST DETAILS

Machine Mart

BRITAIN'S TOOLS & MACHINERY SPECIALIST
SELLING TO PUBLIC AND TRADE FOR OVER 40 YEARS

FOR EXCLUSIVE IN-APP OFFERS

DOWNLOAD NOW

CLARKE GARAGES/WORKSHOPS

SEE FULL RANGE ONLINE

- Extra tough triple layer cover
- Heavy duty steel tubing
- Ratchet tight tensioning

**BRIGHT WHITE
INTERIOR**
**LENGTH
UP TO
40'**


ZIP CLOSE DOOR

Model	Dims	Order Code	WAS inc.VAT	NOW inc.VAT
CG181212	3.6 x 3.6 x 2.5m	140613584	£287.98	£275.98
CG181015	4.5 x 3 x 2.4m	140613570	£331.20	£310.80
CG181216	4.9 x 3.7 x 2.5m	140613574	£378.00	£358.80
CG181020	6.1 x 3 x 2.4m	140613572	£406.80	£382.80
CG181220	6.1 x 3.7 x 2.5m	140613576	£466.80	£442.80
CG181224	7.3 x 3.7 x 2.5m	140613578	£574.80	£550.80
CG1432	9.7 x 4.3 x 3.65m	140613594	£1294.80	£1282.80
CG1640	12 x 4.9 x 4.3m	140613596	-	£2758.80

CG181220
140613576
**KEEPS THE
WEATHER
OUT!**
**PRICE CUT
NOW FROM**
£275.98
 inc.VAT
 WAS £287.98 inc.VAT

**CLARKE
DRILL PRESSES**
CDP102B
060715512
FROM
£101.99
 inc.VAT

**WIDE RANGE
SEE ONLINE
& IN STORE**

- Range of precision bench & floor presses for enthusiast, engineering & industrial applications

**BEST
SELLER**

Model	Motor (W)	Speeds	Order Code	WAS inc.VAT	NOW inc.VAT
CDP5EB	350 / 5	060712030	-	£101.99	
CDP102B	350 / 5	060715512	£131.98	£119.98	
CDP152B	450 / 12	060715522	£214.80	£203.98	
CDP452B	550 / 16	060715575	£346.80	£334.80	
CDP502F	1100 / 12	060715592	£810.00	£778.80	

B = Bench mounted
F = Floor standing
CLARKE BENCH GRINDERS
**13
MODELS
IN THE
RANGE**
FROM
£77.99
 inc.VAT
CBG6250LW
060716252
**STANDS
AVAILABLE
FROM ONLY**
£59.98
 inc.VAT

Model	Duty	Wheel Dia.	Order Code	inc.VAT
CBG6RZ	PRO	150mm	060510211	£77.99
CBG6250LW	HD	150mm	060716252	£83.98
CBG6370LW	HD	200mm	060718371	£113.98

CLARKE BENCH BUFFERS/POLISHERS

**For a
brilliant shine**

Model	Dia. (mm)	Order Code	WAS inc.VAT	NOW inc.VAT
CBB150	150	060710485	£89.99	£88.79
CBB200	200	060710490	£113.99	£110.39
CHDB500	150	060710492	-	£143.98
CBB250	250	060710491	£203.98	£197.99

**CLARKE INDUSTRIAL
ELECTRIC MOTORS**

- Range of single phase motors suited to many applications
- All totally enclosed & fan ventilated for reliable long-term service

Hp	Shaft Speed	Order Code	inc.VAT
1/3	4 pole	010210426	£95.98
1	2 pole	010210431	£119.98
3/4	4 pole	010210430	£125.99
2	2 pole	010210435	£149.99
3	2 pole	010210465	£185.99
4 1/2	2 pole	010210471	£221.99

WAS £227.98 inc.VAT

**3HP 2-POLAR
MOTOR**
 010210465

FROM
£95.98
 inc.VAT

**CLARKE BOLTLESS SHELVING/
BENCHES**

- Simple fast assembly in minutes using only a hammer


FROM
£47.98
 inc.VAT

CHOICE OF 5 COLOURS
 RED, BLUE, SILVER, GREY & GALVANISED STEEL

WAS £69.59 inc.VAT

Model	Shelf capacity	Dims	Order Code	inc.VAT
CSMS150RP	150kg	800x300x1500	070710802	£47.98
CSMS350RP	350kg	900x400x1800	070710808	£63.59

**CLARKE
METAL LATHE**

- 300mm between centres
- LH/RH thread screw cutting
- Electronic variable speed
- Gear change set
- Self centering 3 jaw chuck & guard
- Power feed

PRICE CUT
£790.80
 inc.VAT
 WAS £814.80 inc.VAT

**VIDEO
ON-LINE**
CL300M
060712525
**CLARKE MMA & ARC/TIG
INVERTER WELDERS**
**PRICE CUT
NOW FROM**
£95.98
 inc.VAT
 WAS £113.98 inc.VAT
MMA200A
01012163

Model	Min/Max Output Current	Electrode Dia. (mm)	Order Code	WAS inc.VAT	NOW inc.VAT
MMA140A	20A-140A	1.6-3.2	01012161	£113.98	£95.98
MMA200A	20A-200A	1.6-3.2	01012163	£143.98	£131.98
AT165	10A-160A	2.5/3.2/4.0	01012149	£263.98	£251.98

**CLARKE
ARC ACTIVATED
HEADSHIELD**

- Activates instantly when Arc is struck
- Protects to EN379
- Suitable for arc, MIG, TIG & gas welding

GW7
010120709
PRICE CUT
£40.79
 inc.VAT
 WAS £41.99 inc.VAT

**CLARKE MILLING
DRILLING MACHINES**

**PRICE CUT
NOW FROM**
£634.80
 inc.VAT
 WAS £658.80 inc.VAT

- Ideal for the compact workshop

CMD300
060710300CMD10
060710850

Model	Motor	Spindle Speeds	Order Code	inc.VAT
CMD10	150W/230V	100-2000rpm	060710850	£634.80
CMD300	470W/230V	0-2500rpm	060710300	£814.80


**CLARKE 3-IN-1 SHEET
METAL MACHINES**


- Bends, slip rolls and shears mild steel sheet up to 1mm
- Max. bending angle 0-90°

**PRICE CUT
NOW FROM**
£335.98
 inc.VAT
 WAS £346.80 inc.VAT

**ROLLING,
SHEARING &
FOLDING**
SBR305B
051216001

Model	Bed Width	Order Code	WAS inc.VAT	NOW inc.VAT
SBR305B	305mm (12")	051216001	£346.80	£335.98
SBR760B	760mm (30")	051216031	£826.80	£814.80

**CLARKE 18V
BRUSHLESS
COMBI DRILLS**

- 2 forward and reverse gears

£95.98
 inc.VAT
CON18LIC
060219531
2x2Ah
CLARKE BELT AND DISC SANDER

- Belt sanding can be performed with the belt in the horizontal or vertical position
- Includes dust collection bag


PRICE CUT
£215.98
 inc.VAT
 WAS £226.80 inc.VAT
CS48
060611430
**CLARKE ENGINEERS HEAVY DUTY
STEEL WORKBENCHES**

- Sturdy lower shelf
- Durable powder coated finish


**INCLUDES
SINGLE
LOCKABLE
DRAWER**

Shown fitted with optional 3 drawer unit Only £143.98 inc.VAT

**PRICE CUT
NOW FROM**
£299.98
 inc.VAT
 WAS £311.98 inc.VAT
 WAS £335.98 inc.VAT
 WAS £358.80 inc.VAT

Model	Dims. LxWxH (mm)	Order Code	inc.VAT
CWB1500D	1500x650x985	040317718	£299.98
CWB2001P	2000x650x865	040317809	£323.98
CWB2000D	2000x650x880	040317807	£347.98

**EASY WAYS
TO BUY...**
**CALL & COLLECT
AT STORES TODAY**
**CLICK & COLLECT
OVER 10,500 LOCATIONS**
**VISIT
STORES NATIONWIDE**
**CALL
0115 956 5555**
**BROWSE
machinemart.co.uk**

BARNLEY, S71 1HA	01226 732297	DEAL KENT, CT14 6BQ	01304 373434
BIRMINGHAM, GT. BARR, B43 6NR	0121 358 7977	DERBY, DE1 2ED	01332 290931
BIRMINGHAM HAY MILLS, B25 8DA	0121 771 3433	DONCASTER, DN2 4NY	01302 245999
BOLTON, BL3 4BD	01204 365799	DUNDEE, DD1 3ET	01382 225140
BRADFORD, BD1 3BN	01274 390962	EDINBURGH, EH8 7BR	0131 659 5919
BRIGHTON, BN1 9JJ	0117 935 1060	EXETER, EX2 8QG	01392 256744
BURTON, DE14 3QZ	01283 564708	GATESHEAD, NE8 4XA	0191 493 2520
CAMBRIDGE, CB4 3HL	01223 322675	GLASGOW, G4 9EJ	0141 332 9231
CARDIFF, CF24 3DN	02920 465424	GLOUCESTER, GL1 4HY	01452 417948
CARLISLE, CA1 1JG	01228 591666	GRIMSBY, DN32 9BD	01472 354435
CHELTENHAM, GL52 2EH	01242 514402	HULL, HU9 1HG	01482 223161
CHESTER, CH1 3PE	01244 311258	ILFORD, IG2 7HU	0208 518 4286
COLCHESTER, CO1 1RE	01206 762831	IPSWICH, IP1 1UZ	01473 221253
COVENTRY, CV1 1HT	02476 224227	LEEDS, LS4 2AS	0113 231 0400
CROYDON, CR2 6BE	0208 763 0640	LEICESTER, LE4 6PN	0116 261 0688
DARLINGTON, DL1 1RB	01325 380841	LINCOLN, LN5 8HG	01522 543036

01304 373434	LIVERPOOL, L3 5NF	0151 709 4484	PRESTON, PR2 6BU	01772 703263
01332 290931	LONDON CATFORD, SE6 3ND	0208 695 5684	SHEFFIELD, S2 4HJ	0114 258 0831
01302 245999	LONDON EDMONTON, N18 0Z0	0208 803 0861	SIDCUP, DA15 9LU	0208 3042069
01382 225140	LONDON LEYTON, E10 7EB	0208 558 8284	SOUTHAMPTON, SO17 3SP	02380 557788
0131 659 5919	LUTON, LU4 8JS	01582 728063	SOUTHEAST, SS9 3JJ	01702 483742
01392 256744	MADSTONE, ME15 6HE	01623 769572	STOKE-ON-TRENT, ST1 5EH	01782 287321
0191 493 2520	MANCHESTER, OPENSHEW, M11 1AA	01623 622160	SUNDERLAND, SR2 9QF	0191 510 8773
0141 332 9231	MANSFIELD, NG19 7AR	01642 677881	SWANSEA, SA7 9AG	01792 792969
01452 417948	MIDDLESBROUGH, TS17 6BZ	01603 766402	SWINDON, SN1 3AW	01793 491717
01472 354435	NORWICH, NR2 4LZ	01604 267840	TWICKENHAM, TW1 4AW	0208 892 9117
01482 223161	NORTHAMPTON, NN5 5JN	0115 956 1811	WARRINGTON, WA2 8JP	01925 630937
0208 518 4286	NOTTINGHAM, NG1 1GW	01733 311770	WIGAN, WN5 9AU	01942 323785
01473 221253	PETERBOROUGH, PE1 2PE	01752 254050	WOLVERHAMPTON, WV4 6EL	01902 494186
0113 231 0400	PLYMOUTH, PL4 9HY	01202 717913	WORCESTER, WR1 1JZ	01905 723451
0116 261 0688	POOLE, BH14 9HT	02392 654777		
01522 543036	PORSMOUTH, PO3 5EF			

0151 709 4484	PRESTON, PR2 6BU	01772 703263
0208 695 5684	SHEFFIELD, S2 4HJ	0114 258 0831
0208 803 0861	SIDCUP, DA15 9LU	0208 3042069
0208 558 8284	SOUTHAMPTON, SO17 3SP	02380 557788
01582 728063	SOUTHEAST, SS9 3JJ	01702 483742
01623 769572	STOKE-ON-TRENT, ST1 5EH	01782 287321
01623 622160	SUNDERLAND, SR2 9QF	0191 510 8773
01642 677881	SWANSEA, SA7 9AG	01792 792969
01603 766402	SWINDON, SN1 3AW	01793 491717
01604 267840	TWICKENHAM, TW1 4AW	0208 892 9117
0115 956 1811	WARRINGTON, WA2 8JP	01925 630937
01733 311770	WIGAN, WN5 9AU	01942 323785
01752 254050	WOLVERHAMPTON, WV4 6EL	01902 494186
01202 717913	WORCESTER, WR1 1JZ	01905 723451
02392 654777		

01772 703263	PRESTON, PR2 6BU	01772 703263
0114 258 0831	SHEFFIELD, S2 4HJ	0114 258 0831
0208 3042069	SIDCUP, DA15 9LU	0208 3042069
02380 557788	SOUTHAMPTON, SO17 3SP	02380 557788
01702 483742	SOUTHEAST, SS9 3JJ	01702 483742
01782 287321	STOKE-ON-TRENT, ST1 5EH	01782 287321
0191 510 8773	SUNDERLAND, SR2 9QF	0191 510 8773
01792 792969	SWANSEA, SA7 9AG	01792 792969
01793 491717	SWINDON, SN1 3AW	01793 4917

POSTBAG

The Editor welcomes letters for these columns, but they must be brief. Photographs are invited which illustrate points of interest raised by the writer

PostBag is one of the most popular sections of the magazine - readers want to hear from you! Drop us a line sharing your advice, questions or opinions. Why not send us a picture of your latest workshop creation, or that strange tool you found in a boot sale? Email your contributions to neil.wyatt@kelsey.co.uk.

MYFORD POWER CROSS FEED

Dear Neil, I read John Richardson's recent enquiry with interest as I made a power cross feed for my Myford Super 7, for which I gained a Silver medal at the 1993 M.E. Exhibition. The then Editor requested an article, which I wrote, and probably was published in 1994. I was only able to date this matter by reference to my framed Silver Medal certificate. If John can find that article, he would then be able to make the item.

David R. Machin, by email

A REPLY FROM JOHN RICHARDSON

Hallo, Neil, many thanks for letting me know the issues of ME in which David Machin's articles on his powered cross slide appeared, but I'm left wondering how to obtain the issues in question.

Are you in a position to insert a note in your next issue asking your readers if anyone would be kind enough to help me out with back copies? My experience with scans,

particularly with fine line drawings, is that they need to be done with a high level of "dpi", or lines may disappear.

John Richardson

Thanks David, your series appeared in *Model Engineer* 3971, 17 June 1994 and then odd numbered issues up to 3987. If any reader can help John with back issues or good scans, let me know and I will put them in touch - **Neil**.

THE TRAM ENGINE

Dear Neil, I just had to write about this wonderful description about Graeme Monks building of a Tram Engine. First of all, it is a wonderful idea to build a steam tram engine, and it is very nice that he is building something. Another reason I just had to write is that I admire his writing as it is so easy to read and just flows. There has been a lot of thought gone into it. I too wrote to the Great Eastern Society about details for my Y4 when I was building that. I also found them to be most helpful. We have about 35 engines in our society (The LMS) and there are only three of them have a hand pump on them. Injectors are so reliable nowadays that there is no need for a

brake band on the axle. I think that the people who have older locos in our society (Like a pair of Maids of Kent) are fitting two injectors on their 'Maids' as they much prefer a pair of injectors.

It is so nice to see a chap with such enterprise and to be building a proper steam tram engine and all the thought that has gone into it and the homemade fittings that have been used. I love the way that he has designed the driving from either end of the engine and the neatness of the plumbing and other rods. The manifold and its pipework are also a work of art too. I look forward to the next instalment, well done Graeme.

Doug Hewson, Yorkshire

AND A POWER CROSS FEED TIP

Dear Neil, I can't help John Richardson, but a friend of mine uses an el-cheapo cordless drill with speed control. He made an adapter to fit both, works good and simple.

John Fletcher, by email.

CLAN LINE

Hello Neil, In case it is of interest, last Thursday morning I went to London Victoria station to see Rebuilt Merchant Navy class *Clan Line* set off on a trip. Late that evening I went to see it return, this time to Waterloo. The support crew looked pretty tired! The attached photos may be of interest.

Rhys Owen, North Wales



Stan Bray's Brunell

Hello Neil, thank you so much for the email and information [sent by *ME&W* readers]. It's great that even someone from the 'other side of the world' got in touch!

Helmut Harhaus, Germany

CITY AND GUILDS

Dear Neil, the article on City and Guilds 193 in August's *ME&W* by Mick Knights evoked memories of my own apprenticeship. I was probably among the last of those to go through the system from 1979 to 1984 and well remember my time at both College and the Training Centre. This was followed by an HNC in Production Engineering where the examiners could not believe that I had not only designed but actually constructed my special project. However, I am convinced that by taking the path that it did the Engineering Industry made a great mistake and lost its vision for the future which is why it now lags behind other countries. I made this point in my resignation letter to the IET but I do not think they were interested. My own working life concluded with me running my own gardening business but the skills I acquired through City and Guilds never left me and I was able to use them in many different ways. Now in retirement I have completed the construction of a workshop in my garage complete with lathe and milling machines, so I am now finding great joy reigniting all those skills in the world of model engineering.

Mark Davis, by email.

BUILDING STAND

Hello Neil, do you have on file any plans for a simple 360° rotating erecting stand? I am building a 5" gauge Britannia class loco and it is getting a bit heavy At 79 I need a little help

Kerry Boylan, via the website.

Hi Kerry, in issue 4253 of *Model Engineer*, August 5 2005, Colin Abrey presented a design that may meet your requirements. This issue is available in our online archive – **Neil**

WIMSHURST MACHINES

Dear Neil, I was amused to read Geoff Theasby's comments in Club News, issue 4779, about having a Wimshurst machine in his lounge.

When I was at secondary school in the early 1960s we had a Wimshurst machine and also a Van De Graaf generator in the physics lab and they were great fun to use. Everyone from the brightest to the dimmest learnt about them and how they worked. We learnt to treat them with respect.

Well now I have one of my own. It's been on a coffee table in my lounge for about two years. I also have in the same room a long case clock, two German wall clocks, a Vienna regulator and a cuckoo clock. (Yes, they all chime throughout the day and the night.)

So far not a single visitor of any age has had any idea what the Wimshurst machine is. They look at the segments on the discs and think it's another clock but can't work out how to tell the time with it. It's quite entertaining to watch the varied reactions when I demonstrate it with a 2-inch-long spark and the accompanying crackle.

It's a sad reflection on how the modern (post 1960s) education system teaches, or fails to teach, science based subjects.

John Wing, Sawley, Derbyshire

DENBIGH DRILL PRESS RESTORATION

Dear Neil, as a reader/ subscriber of *Model Engineer & Workshop* I am reaching out in search of some information in relation to a restoration project I have undertaken of late. It is a Denbigh Drill Press (Bench) and wondering if I could use the magazine to reach a like-minded audience. I'm hoping someone is out there who knows about these machines and can help locate a manual. I am aiming to put it back to (as close as possible) how it would have been leaving the factory. - Yes it also works fine. I have reached out to Tony Griffiths who has a site dedicated to vintage machinery. He also has these on his site but nothing quite like the one I have.

Mark Lockett, by email.



Model Engineers' Workshop Article Index

DATA to June 2012

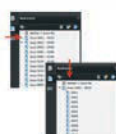
Copyright © Colin Usher, 2012 Chicago Latrobe Bookers

Don't Pithers Colin Usher

The spreadsheet index below is compiled and hosted by Colin Usher at www.colinusher.co.uk. It has been an invaluable resource for hobby and model engineers for many years. Unfortunately, as of July 2012, Colin has no longer been able to update the index.

How to navigate this index

This document is divided into two sections. The top is ordered by issue number and the bottom is ordered by the contributor name (where known). If you enter the issue number, click on the link to the right of the issue number. For example, if you want to go to the page for issue 1, go to the bottom of the list and click on the link to the right of the issue number. If you want to see the article not ordered by author click on the name column. This is arranged in a similar way but alphabetically by name.



DATA and Amendments from July 2012

Copyright © Neil M. Wyatt, 2014

Notwithstanding my personal involvement with *Model Engineer* and *Workshop* magazines, this is a voluntary activity and the index is not bound in any way with the publishers. The index is offered as a free service to hobby engineers for personal use only, and it is not intended for commercial use. No liability can be accepted for any errors or omissions or any consequential loss arising from use of the index. If you have any comments on the index, or find any errors or omissions in it, please use the contact email neil@neilwyatt.co.uk to let me know.

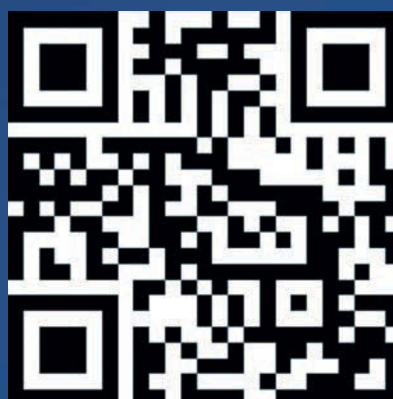
Alternatively, you can use the word / phrase search box.



ONLINE INDEXES

David Frith prepares the indexes for *Model Engineer & Workshop*. The latest copy can be downloaded on from the Forum at www.model-engineer.co.uk – just select Forums and then the Model Engineers' Workshop topic. Alternatively scan the adjacent QR code.

If you prefer the paper indexes, don't worry, David continues to produce these as well.



3D Printing in the Home Workshop

Alan Bryan concludes his review of how a 3D printer can change your hobby, looking at some more storage solutions.

PART 3

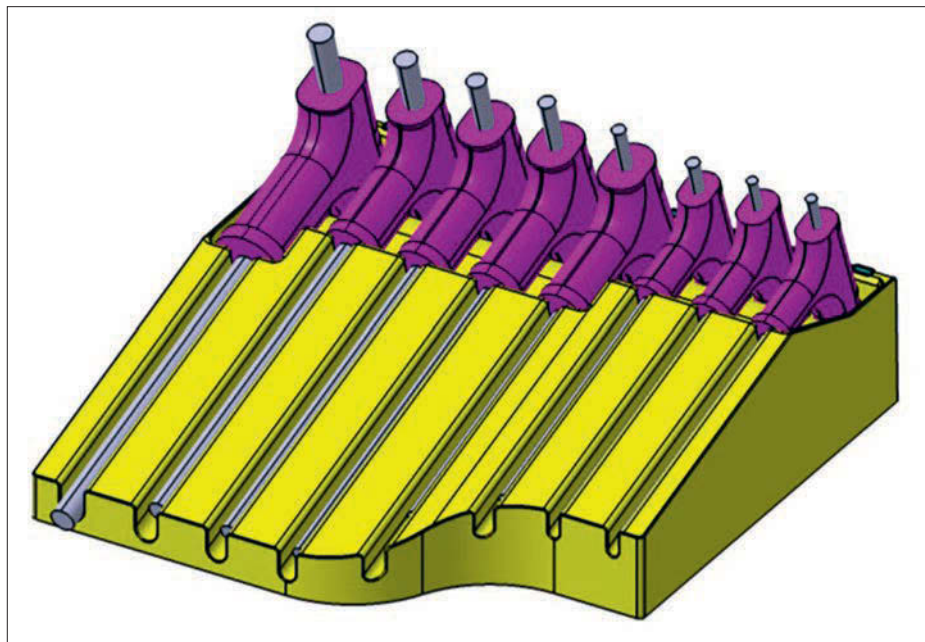


Photo 32: storage tray for a Torx bit key set.



Photo 33: 35mm film canister organiser at home in its ex-shortbread tin.



Photo 34: An exploded view of the organiser.

HAND TOOL STORAGE

I bought a set of Parkside Torx-style keys and they didn't come in anything other than a plastic wallet to store them in. Considering what the cost of them was, they have proved to be extremely durable. They didn't come with anything to store them in though and were easy to displace when just jumbled into a drawer, so I felt it was worth keeping them tidy and organised, **photo 32**. This was one of my earlier pieces and the tray has served its function well making the keys easy to select and track, so the exercise has proved to be worthwhile. I will print another for the equivalent set of Allen Keys one day

35MM FILM CANISTER ORGANISERS

I don't know about you, but I find 35mm Film Canisters to be the ideal size to store those small items like small rivets, 12BA nuts, and miniscule circlips etc. in. Consequently I have amassed many of them over the years. Each filled with unique treasures that often now will be impossible to replace at the sort of prices paid for them years ago.

Over time I devised numerous ways to organise the canisters that I have collected but none were really successful. That was until a couple of Christmases ago when we purchased a rectangular tin of shortbread from M&S. Post Christmas experimentation after the contents had been consumed revealed that a tin accommodated thirty-eight film canisters stood upright in it when packed closely together. The shortbread was nice too, so we bought some more of it which gave me another tin. When last Christmas came around it was still on sale in the same packaging, so we bought some more. I then had a few of these tins and a lot of jumbled canisters in each. It didn't prove to be that easy to find and select the container that I was looking for though, so I needed to organise them better. The obvious way to do it was to secure the tins evenly spaced, and I thought that a 3D printed system would be the best solution by far, **photo 33**.

At first, I thought that it might be a no-go because I couldn't print a complete organiser in one piece. The footprint of the tin was larger than the 220mm square that my printer can accommodate. Then it became

obvious that it wouldn't be possible to assemble it into the tin as single piece because of the overhang created around the tin's rim by the metal forming process and that played right into



Photo 35: Elliot 10M Shaper refurbishment and improvements.

my hands because splitting the organiser into several parts would enable me to assemble the organiser parts into the tin and they would then be self-retaining. Despite having used CAD for over 30 years professionally I still find it to be incredibly satisfying to be able to juggle objects around on a computer screen and I was able to devise a multi piece system made up of only three different components which I could print on my printer using minimal filament. It would be simple to assemble into the tin and, once installed, be self-retaining as I had envisaged. Thus I achieved organised, logical storage for thirty-five canisters, **photo 34**.

ELECTRICAL HOUSING FOR ELLIOT 10M SHAPER

I decided to renovate my single-phase Elliott 10 M Shaper and include several improvements, ergonomic and safety-wise, to the control electrical system

at the same time, **photo 35**. I had never been happy with the 1950's ergonomics which dictated its original situation. The starter had been mounted directly onto the side of the shaper body casting, so I had to reach close to the rotating crank that activated the horizontal traverse of the machine. I therefore mounted the Push Button No Volt Starter on a pillar or column at the rear of the machine together with a machine work light on a flexible arm along with its remote switch. I also wanted to create a central junction where the power came to the machine and was divided off to the motor via the starter and to the machine light which I intended to install.

The electrical items to be accommodated were a junction between the incoming cable and the outgoing consisting of the Push Button NV Starter and the AC/DC transformer for the 12 volt machine light. Therefore I needed to house it all to provide protection and safety. I mounted all the components,



Photo 36: Electrical housing installed on the control column.

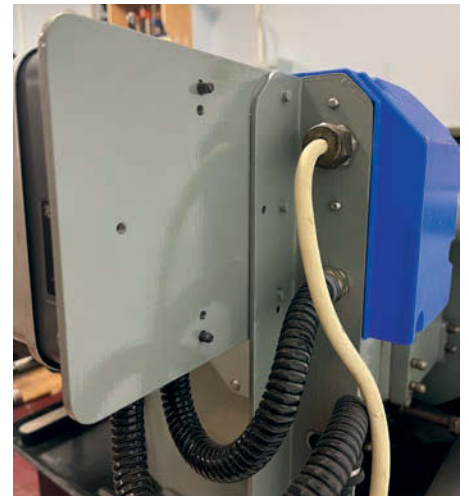


Photo 37: Cable input to the housing.

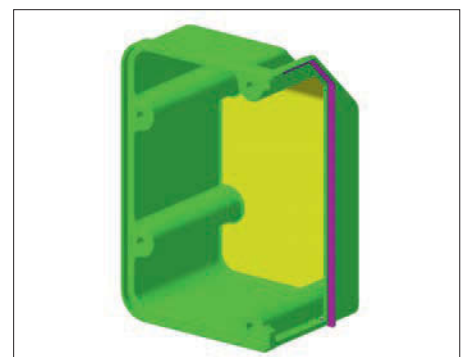


Photo 38: Screen grab showing the interior of the housing.

suitably insulated of course, onto the rear of the top plate.

Therefore everything that needed to be protected was on the same sides of the plate and the column. I was then able to come up with the design for the housing shown in **photos 36** and **37**. **Photographs 38** and **39** show the CAD design.



Photo 39: Grab showing the exterior.

I also designed and modelled a housing for the rocker switch for the machine lamp to snap into, **photo 40**.

I now have a machine which is considerably more ergonomic and several degrees safer as a result.

A DOMESTIC IMPROVEMENT – EXTRACTOR FAN DUCTING ADAPTORS

Whilst refurbishing our en-suite shower room at home we decide to fit an improved extractor fan system to combat the increase in humidity experienced in the winter months. We live in the western extremes of East Anglia, but the winter weather has been wet here in recent years, and something had to be done. We therefore invested in an additional inline ducted extractor fan that has proved to be as good as the plumber that we consulted said it would be. We also purchased the accessories necessary including the grilles, flexible ducting and pipe supports for me to complete the installation.

However, when looking at the termination grilles of the flexible pipe ducts, it was clear that the spigots, when protruding into the loft through the large hole the bathroom ceiling and the similar hole cut in the external soffit giving access into the void in the eaves of the roof, weren't long enough and would only permit about 12mm of engagement with the flexible duct. That in turn meant that it would be difficult to secure the duct onto the grille and outlet spigots with the worm-drive clips necessary to retain them there. Obstructions in the loft space also meant that positioning the clips, especially in the soffit area, would be difficult and I really didn't want to remove any roof tiles to enable me to

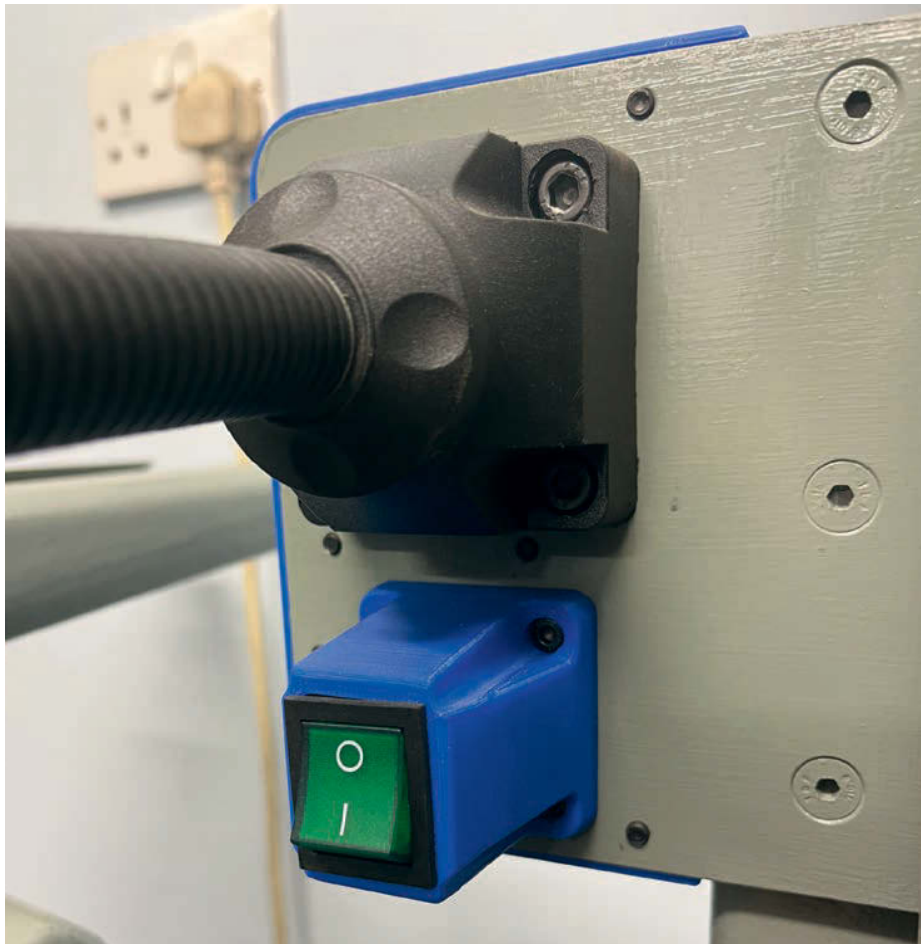


Photo 40: 3D printed rocker switch housing installed on the control column.

gain access to the duct end. Finally, I didn't really like the idea of screwing into the plasterboard ceiling to fix the grilles, or the plastic sandwich material that my soffits are made from.

I therefore decided that the solution would be to terminate the flexible ducts with a 3D Printed adaptor at each end that could be secured by bolting through the ceiling or soffit, **photo 41**. Hopefully the nine moulded hexagonal sockets to retain M5 and M6 nuts are visible in the screen grab when reproduced in the magazine.

The terminations would be fixed into the flexible duct and retained by the worm-drive clips before installation which solved one of the access problems. I would cut the hole in the soffit, then manoeuvre the flexible duct with the flange fixed to it into position between the wall plate and the sarking material, just under the roof tiles, to sit onto the soffit from inside the loft. It would then sit onto the flat plastic soffit and the hole already cut in the soffit would allow access to the duct adaptor to hold it via the cruciform ribs moulded into it, whilst fixing it in place. Then, from outside the house, I inserted the M5 fixing screws through the plastic soffit into the adaptor to hold it in place,

whilst the screws were inserted and engaged on the threaded nuts retained in the recesses moulded into the adaptor. I also used a piece of 6mm diameter steel bar about 300mm long, threaded at the end to screw into a hexagon nut retained in the recess in the cruciform section moulded into the top of the adaptor. That allowed me to manoeuvre the adaptor into position initially because I couldn't reach through the hole far enough to grasp the adaptor. Likewise a similar technique, without the steel bar extension, was used at the other end of the duct where it sat onto the back of the plasterboard over the



Photo 41: The extractor fan duct termination flanged adaptor.

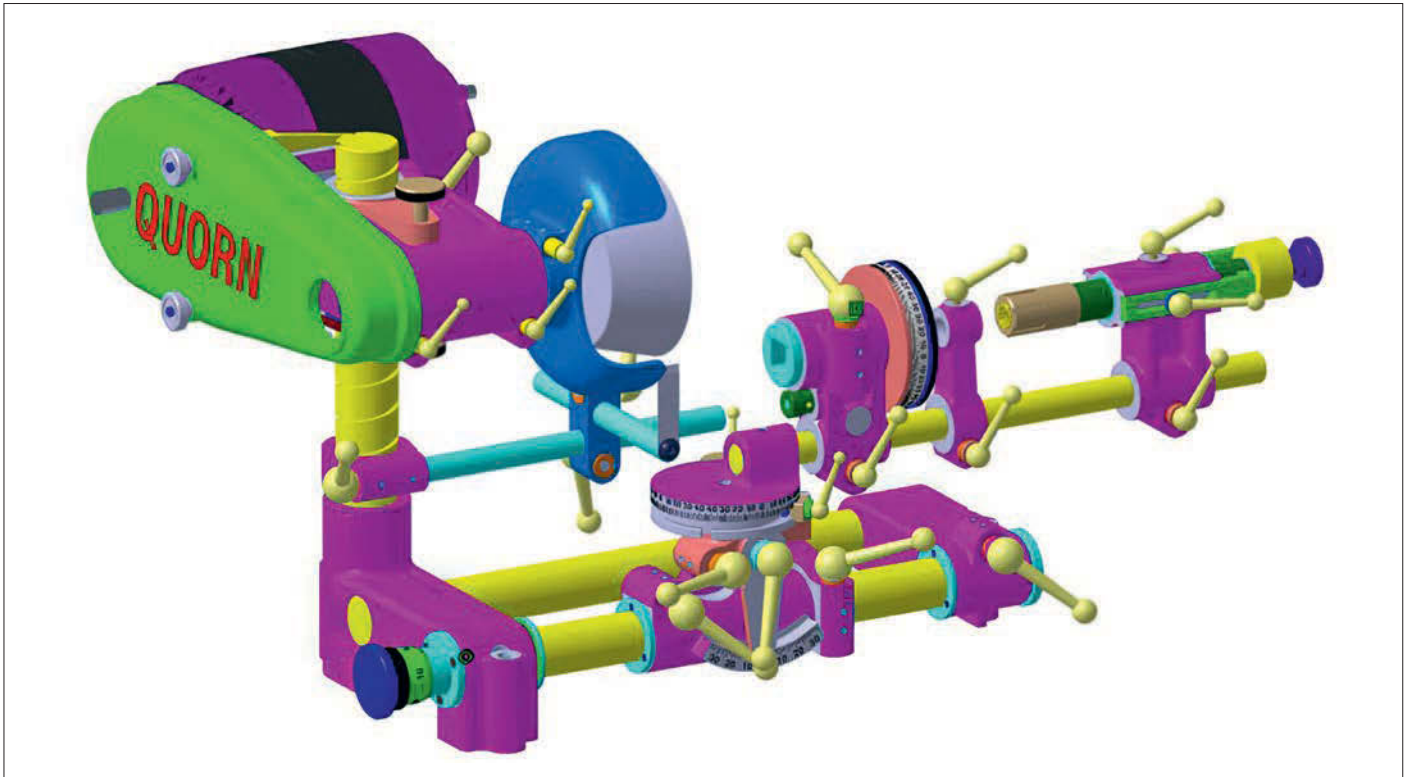


Photo 42: CAD model of my modified Quorn Mk1 universal tool and cutter grinder.



Photo 43: Outside of my Quorn Mk1- belt guard.

shower. The four M5 securing screws for each adaptor were hidden when the grilles were fitted.

Both grilles were located by plugging the spigots located on the back, which would originally have been inserted into the ends of the flexible duct, directly into the adaptor. The spigots ensured concentricity to the duct and also that the M5 screw holes would line up with the holes moulded in the adaptor. Final retention was achieved using four M5 screws, passing through the sandwiched substrate, into retained nuts on the adaptors. Thus both grille and duct retention is not dependent on the fragile plasterboard or the suspect plastic soffit material

It was a work of minimal time to design and model a suitable adaptor which could then be printed in duplicate. I also designed and modelled a drilling jig that plugged into the end of the adaptor, once the holes were cut in the

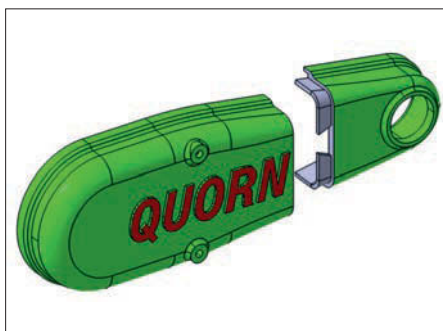


Photo 44: Exploded view of belt guard.

plastic and plasterboard, to ensure that all holes were concentrically located and spaced. The jig was 3D printed too.

The installation worked perfectly with ease of access to difficult-to-get-to areas assured and all the screw holes lined up too. Further, it took minimal time to do the job. As a bonus, if I ever have to do it again, I have the files there ready to print the parts once more.

What I've recounted so far isn't exhaustive of all that I've done with 3d printing. Rather it represents a fair selection of tasks that I've entrusted to it and illustrates just how useful it proved to me over the past year and a bit. I do though have a couple more planned projects, ideas that I'd like to share with you.

PLANNED QUORN PARTS

The castings for my machine were intended to enable construction of a

Mk1 machine. That machine doesn't have a belt guard or a wheel guard. I have mentioned previously that I've modelled the complete machine in 3D as shown in the screen shot, **photo 42**, and that has led to a partial redesign of several areas. I won't go into all of them here, only those for which I intend to use my 3D printer.

BELT GUARD

I mentioned that the Mk1 doesn't have a belt guard. That feature is exclusive to the Mk2 and now also to the MK3 which Hemmingway currently market. Well, I can announce that my Mk1 will also have a belt guard. Presently it exists only in virtual form but after looking at the price of obtaining a Mk2 aluminium casting and dismissing purchasing it as impractical, I've designed the guard to be printed in PLA or possibly another suitable material if there is one better to use. It's able to fit because I've devised a way to mount a motor in the fashion of the Mk2 onto the MK1 castings. The screenshot of the complete machine shows a sneak preview of the guard as I've modelled it, **photo 43**. Because its size precludes printing in one piece on my printer, it's actually in two parts.

Both parts will fit tightly together and be bonded into a single component. **Photographs 44** and **45** show the guard exploded into its two component parts which will be bonded together to form the complete belt guard.

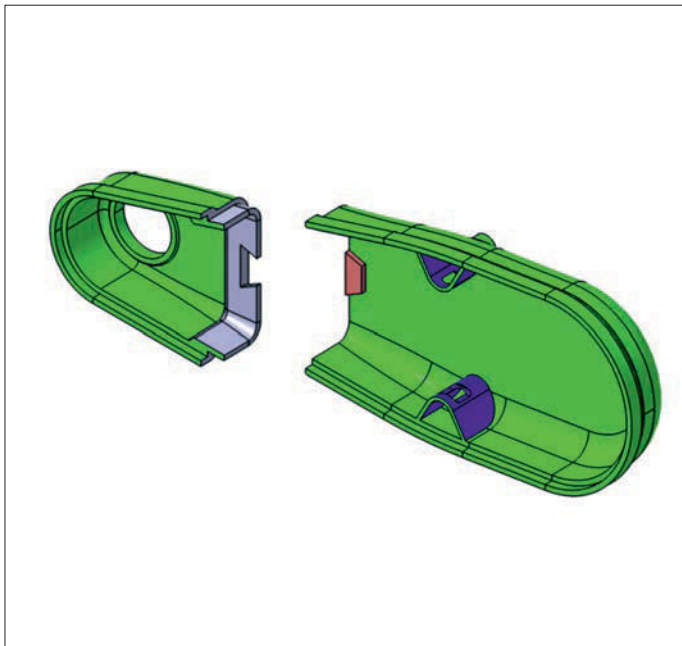


Photo 45: Internal view better showing the attachment method.

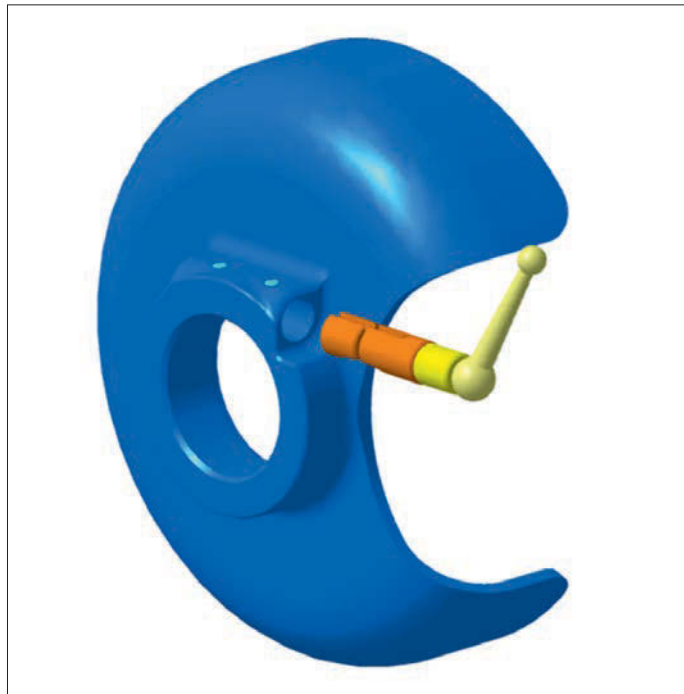


Photo 46: Proposed Quorn Mk1- wheel guard.

GRINDING WHEEL GUARD

I'm not yet 100% certain about this so please bear with me on it. You'll probably note that I've shown a Wheel Guard in the screenshot of my modelled machine. Well, I'm minded to print that also. This time using carbon reinforced PLA or possibly nylon which I believe will be as effective in containing the fragments as the original alloy casting is intended to be should the small grinding wheel burst (I would lean toward Nylon 66 as unlikely to shatter, but instead to deform and absorb energy – Ed.).

I intend to retain it using a split cotter, tightened with a 4mm threaded ball handle. It's one of the applications for the five that I've made.

If you've reached this point in my narrative, then I'm grateful to you for sticking with me. Hopefully, you've found it all to be interesting. Possibly you're now sufficiently inspired to consider taking the plunge and obtaining a printer of your own? I realise though that there is a major obstacle to ownership for a lot of home engineers because you don't all possess the skills to produce your own designs. Not yet anyway.

I've had the benefit of being professionally trained to use 3D CAD and made my living from it for over 30 years so the learning curve for successful 3D Printing wasn't as steep as it may be for some. It can't be denied though that if you are unable to design and model your own ideas you are restricted to looking for ideas that others have designed and modelled and made

available for download. CreaLity have a library that you are allowed to use to download files from and I have made use of a few of them, and other printer manufacturers have their own libraries for the same purpose. There are also numerous designs available from many providers via the internet. Some are free to download whilst others are charged for. It's not ideal though, because you'll never find exactly what you need and it will always be a compromise. The only way to get exactly what you want is to design and model it yourself.

There's a way around that though because 3D CAD packages are available for amateur users now, either free or at very reasonable prices. You can then learn to use what you have purchased/downloaded for, often free, online tutorials. If you want to design for 3D printing, then you must use a 3D Modelling CAD Package. Forget 2D Cad; it's a dead end. Designing for your workshop will require 2D drawings but all 3D CAD modelling packages produce 2D drawings from the 3D model. Producing a 3D model from a 2D drawing is possible if you know how to do it but really, it's an unnecessary exercise to waste your time on. Start with a 3D modelling package and you won't go wrong.

To anyone who is interested in taking that route, I'd encourage you to do some research, obtain one and attempt to learn how to use it. Despite what others may say, 3D CAD is not difficult to learn to use. When I trained to use it, I came to it with a history that featured thousands of hours of designing and

drafting car bodies manually and I had to forget thinking in terms of three-views to describe an object and instead visualise it in 3D. Once I had got my head around that it came more easily and I've never stopped learning since. 99% of those who trained with me also succeeded and only two fell by the way-side. It became clear to me at that time that you have to leave behind all the previous ideas about view projection before sitting down in front of a screen. Once you've done that, you'll find that a whole new world will open up for you. Then, add a 3D printer and that world becomes yours to print.

For those who own a printer but lack the facilities, or the knowledge or simply the will to produce their own designs for parts. If there is sufficient demand for it, I can make STP or STL files available from my projects for those interested in printing parts for their own use. You can then slice them using your printer's supplied software and produce your own G-Code files to print. Contact the Editor if you're interested in that and we'll see if we can work something out.

DISCLAIMER

If you decide to use to use my models, I am unable to take responsibility if you do not achieve your desired results due to the many different variations that it's possible to make to the concept prior to and during the slicing stage. I made mine from PLA filament. I haven't tried any other materials. It may perform slightly differently if made from another filament so that is your risk. ●

Milbury

MODEL COMPANY

WilescO

SAVE 10% ON ALL WILESCO MODELS
Exclusive offer for readers of Model Engineer and Workshop

Use discount code
ENGINEER10

SHOP ONLINE OR VISIT OUR SHOWROOM
Near Exeter, Devon
STEAM ENGINES • SPARES • ACCESSORIES

CONTACT US
CALL US 01392 715322
EMAIL INFO@MILBURYMODELS.CO.UK
WWW.MILBURYMODELS.CO.UK



**WILESCO D5 STATIONARY
STEAM ENGINE KIT**



~~£115.00~~ **£104.55**

**WILESCO D409 SHOWMAN'S
TRACTION ENGINE**



~~£499.00~~ **£453.63**

WILESCO M78 FERRIS WHEEL



~~£92.50~~ **£84.09**

**WILESCO D365 STEAM
ROLLER 'OLD SMOKY' GREEN**



~~£309.00~~ **£280.91**

**MSS O-4-O STEAM LOCOMOTIVE
'O' GAUGE - BLACK**



£299.00

**RETROL HM-01 HIT AND MISS
ENGINE MODEL (ASSEMBLED)**



£495.00

SOUTH WEST
EST. 2001
BERRYBROOK
STEAM & CLASSICS



Sell your miniature steam engine with confidence

Berrybrook Steam & Classics is seeking quality miniature steam engines. Fair prices, expert knowledge and a straightforward process.

CALL US ON:
01392 833 301

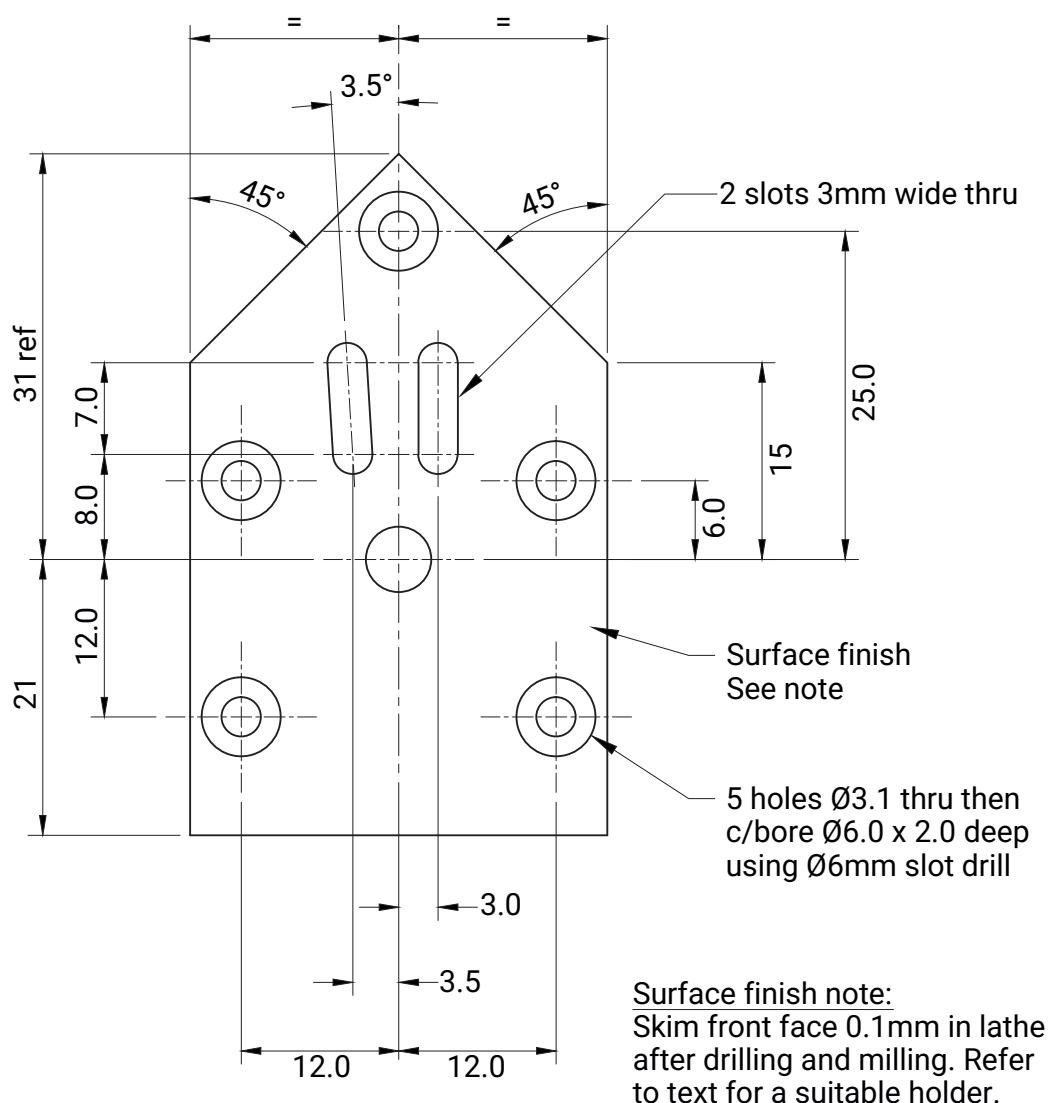
OR VISIT:
berrybrooksteam.co.uk

Fourrunner Mk2 Oscillating Engine PART 2

Peter Stuart shares his updated design based on David Fulton's design, described by his son Stuart Fulton in ME&W issues 4776 and 4777.



Fig 4



Port Plate

Mat'l: 31.8 x 3.2 brass

Qty: 2 off as shown - stamp on back '1' & '2'

Qty: 2 off opposite hand - stamp on back '3' & '4'

PORT PLATES

These are important for the smooth running of the engine and care must be taken in their manufacture, **fig. 4**. They are detachable from the manifold so those who want to experiment in future with the shape of the slots can do so easily.

The ports are long parallel slots, instead of David Fulton's wedge-shaped ports. I made David's suggested cardboard model, and it became apparent to me that wedge-shaped holes are not necessary and would be more complicated to cut. Note though, that the inlet ports of this MK2 version are inclined at 3.5° to the

centreline of the port plates. Note also that two plates must be made opposite hand to the other two as per fig. 4.

The plates are more easily held in the mill vice if they are made in pairs at opposite ends of a 110mm long piece of 31.8mm x 3.2mm flat brass (Ed's note: that's 1 1/4" x 1/8" imperial stock, hence the 'odd' dimensions). Machining

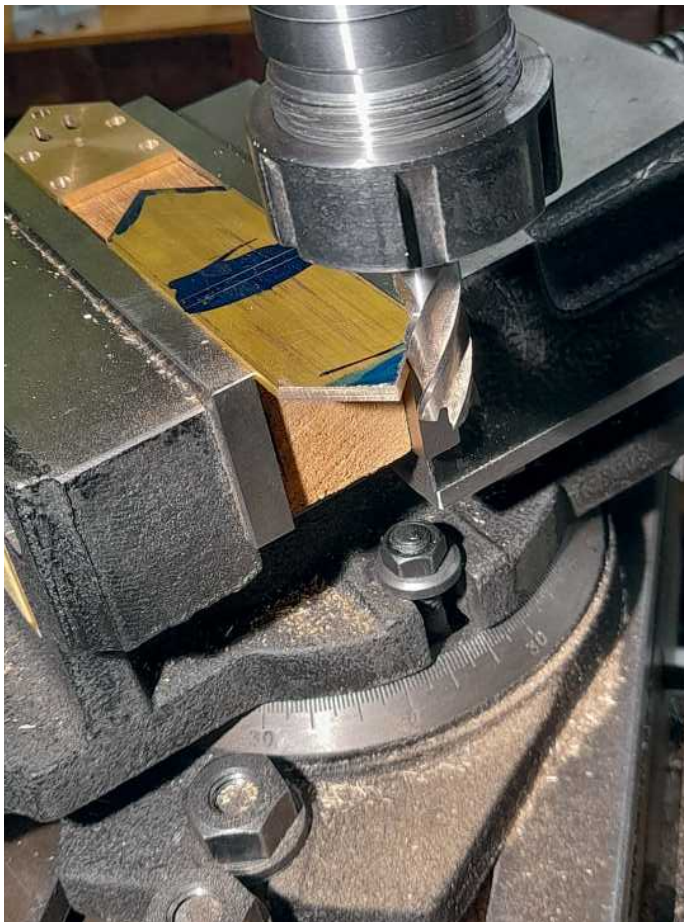


Photo 10: Mitring the ends of the port plates.

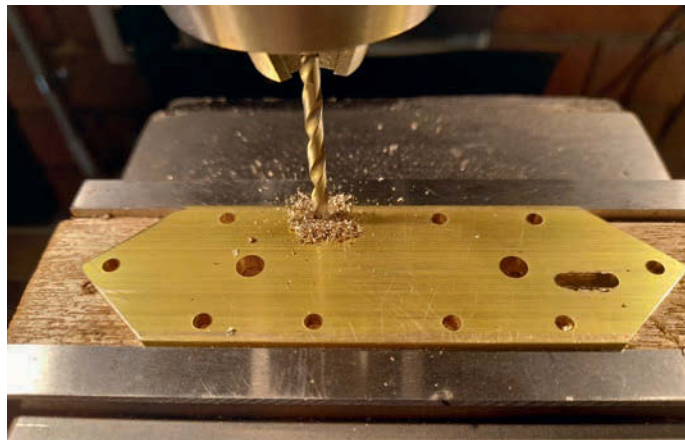


Photo 11: Drilling holes in the port plates.



Photo 12: Machining slots in the port plates.

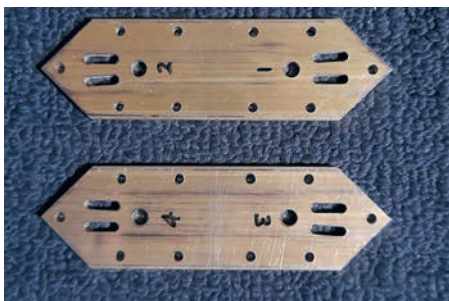


Photo 13: Finished opposite-hand port plates.

Table 1 – List of Fasteners

Size	Type	Qty	Notes
M3 x 6	Button Hd Skt Screw	20	SS304
M3 x 10	Skt Hd Capscrew	60	Black high tensile
M3 x 16	Skt Hd Capscrew	6	Black high tensile
M4 x 12	Skt Hd Capscrew	4	Black high tensile
M4	Hex Nut	4	Zinc plated
M5 x 10	Skt Hd Capscrew	10	Black high tensile
M5 x 6	Skt Hd Grubscrew	2	Cup Point

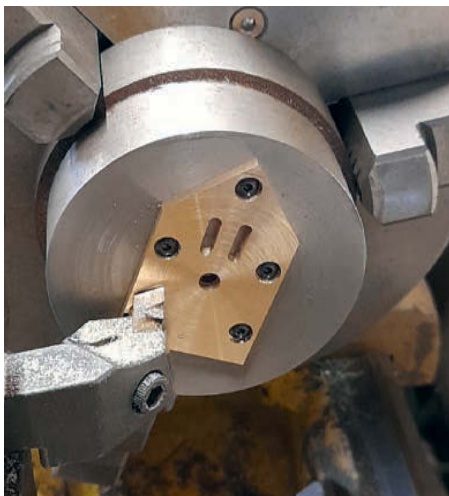


Photo 14: Lightly skimming the port plates.

the mitred ends and drilling of holes, **photos 10** and **11**, can be completed on each end individually.

Milling the slots should be started with three 3mm holes drilled in line, one at each end of the slot and one in the middle. A 3mm endmill will cut the slots from end to end with a series of passes at 0.5mm depth of cut and very slow hand feed, **photos 12** and **13**. Later, the brass bar can be cut in half and trimmed to length.

When drilling and milling is completed, each plate can be screwed to the face of a suitable jig and held in

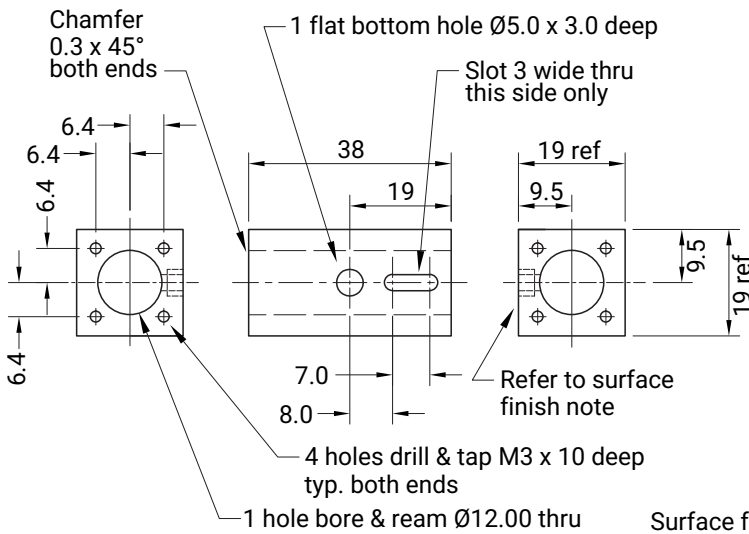
the lathe chuck for a light skim across the face, **photo 14**.

Gaskets also need to be cut from S-207 blue gasket paper 0.8mm thick, available online.

CYLINDERS

These are made from 19mm square brass, **fig. 5**, with the bore positioned along the centreline. There are no rings on the pistons so the bores must be a good, neat sliding fit for the pistons. I made my pistons from a length of 12mm ground rod I had on

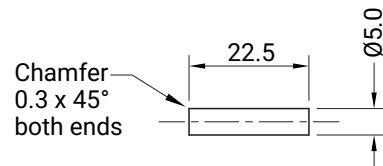
Fig 5



Cylinder

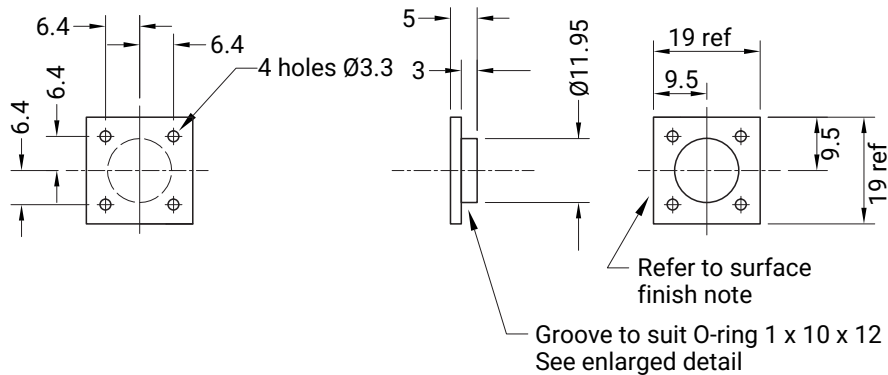
Mat'l: Brass 19 x 19mm, 4 off

Surface finish note:
Skim front face 0.1 - 0.2mm in lathe after drilling and milling



Cylinder Pivot Pin

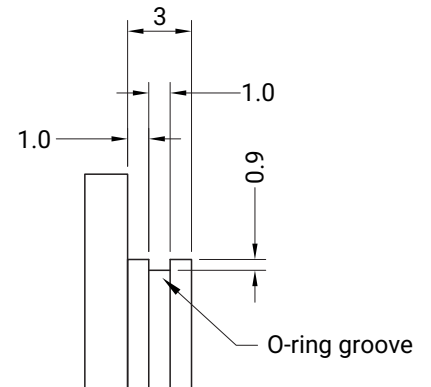
Mat'l: Ø5mm ground steel rod, 2 off



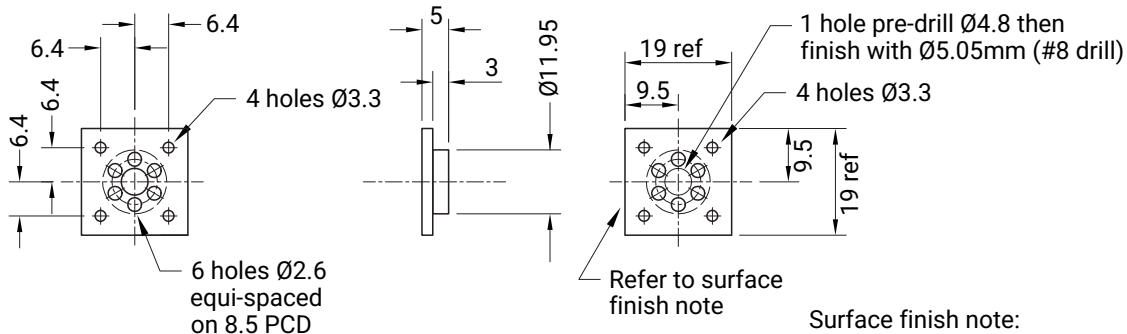
Cylinder End Cover - Top

Mat'l: Brass 19 x 19mm, 4 off

Surface finish note:
Skim one edge 0.5mm to prevent overhang of cylinders front face



Enlarged view of groove detail



Cylinder End Cover - Bottom

Mat'l: Brass 19 x 19mm, 4 off

Surface finish note:
Skim one edge 0.5mm to prevent overhang of cylinder front face

Table 2 – Parts List

Description	Quantity	Notes
Endplate Front	1	Flywheel end
Endplate Rear	1	Output Shaft end
Manifold	1	Brass
Spacer Plain	3	
Spacer Threaded	3	
Spacer Long	2	
Port Plate RH	2	Brass
Port Plate LH	2	Brass
Cylinder	4	Brass
Cylinder Cover Top	4	Brass
Cylinder Cover Bottom	4	Brass
Cylinder Pivot Pin	2	
Thrust Pin Guide	4	
Thrust Pin	4	
Big End with Piston Rod	4	
Piston	4	1214 or SS304 - see text
Crankshaft	1	
Bearing Housing	2	
Flywheel	1	
Inlet flange - with O-ring groove	1	Brass
Inlet flange - plain	1	Brass
Inlet tube 6 OD x 0.5mm wall	1	Brass
Deep Groove Bearing	4	608-2RS
Thrust Bearing	4	F4-M9 4x9x4mm
O-ring - Cylinder Cover Top	4	Metric O-ring 1x10x12
O-ring - Inlet Flange	1	Metric O-ring 1.5x6x9
Gasket - 250x200mm sheet	1	S-207 blue 0.8mm thick

hand, so I had to bore the cylinders to match these. If you are machining the OD of your own pistons, it would be better to make these last, in order to fit your finely finished cylinder bores.

After boring the cylinders, lightly

skim one face, then cut the slot in the same face and bore the flat bottom hole, **photo 15**. Drill and tap the M3 holes in the ends, **photo 16**.

The top and bottom cylinder covers are made from the same 19mm square



Photo 15: Drilling a flat-bottomed hole in a cylinder.



Photo 16: Tapping holes in the ends of a cylinder.

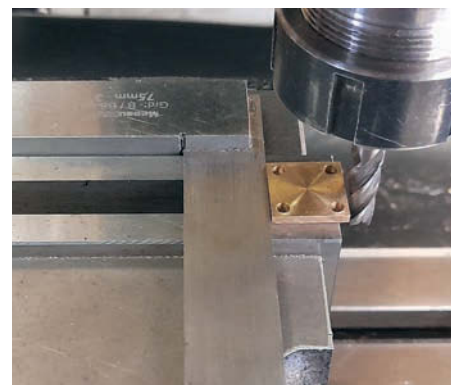


Photo 17: Cutting a light relief along one edge of an end cover.

brass stock. One edge should be relieved a little to avoid it overhanging the cylinder's skimmed face, thus ensuring the face fully contacts the port plates, **photo 17**.

to be continued

Lathework Tips

Paul Tiney shares a few tips to make life a little easier, not for you but for your lathe.



CHUCK CRADLE

I always put this offcut of hard-wood, **photo 1**, on my lathe bed ways when removing or replacing the chuck. A couple of minutes with a chisel ensured it just slides under my three jaw chuck, and the two angled wedges steadies the chuck when it's off. Instead of the danger of it dropping off the lathe nose and landing with a bump on the bed ways, I can slide it away from, or up to, the nose with ease. The chuck is a big old lump to swing about especially with the back plate attached and the wood is also suitable to use when fitting or removing my four jaw chuck.

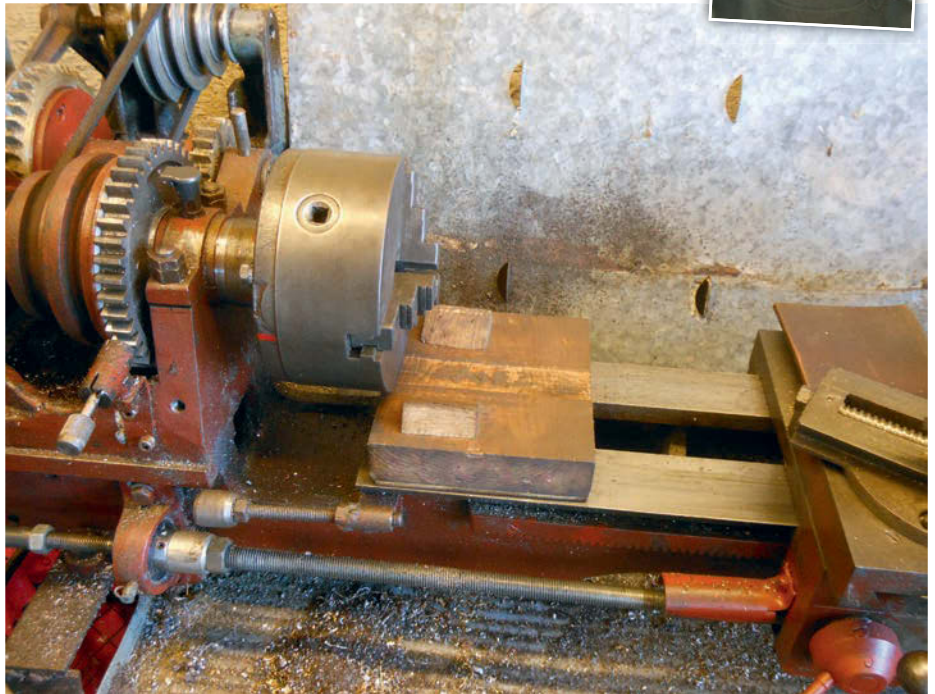


Photo 1: Wooden chuck cradle.

THREAD PROTECTOR

When chucks or face plates are not in use a stump of dowel pushed into the mounting thread prevents 'workshop dirt' (now be honest, there is frequently much of it about) from getting in the threads, **photo 2**. The threads on the lathe nose and the internal ones in the chuck mounting plates are probably the most important ones on the lathe for ensuring maintained accuracy of the machine.

back plate and wound down they will quickly clean out any swarf that has got into the threads, **photo 4**.

push from behind through the hollow shaft. I now even have a short length of stiff wire, hanging on a nail, to poke it in place through the open jaws of the chuck. Oh while we are on the subject of cleaning that internal taper, if you must push a bit of rag in, on the end of your finger, do please ensure the motor is isolated at the main switch, and not just 'off' at the button. I need not elaborate further.

THREAD CLEANER

This spring thing, **photo 3**, made from a gas welding rod, has the ends bent out at right angles and filed to a point. Sprung into the threads in the chuck

MORSE TAPER PLUG

This wee wooden tapered plug is a light push fit into the lathe nose Morse taper (other tapers are available) and prevents swarf finding its way 'up the pipe'. It is easily removed by giving it a



Photo 2: Wooden plugs to protect chuck threads.

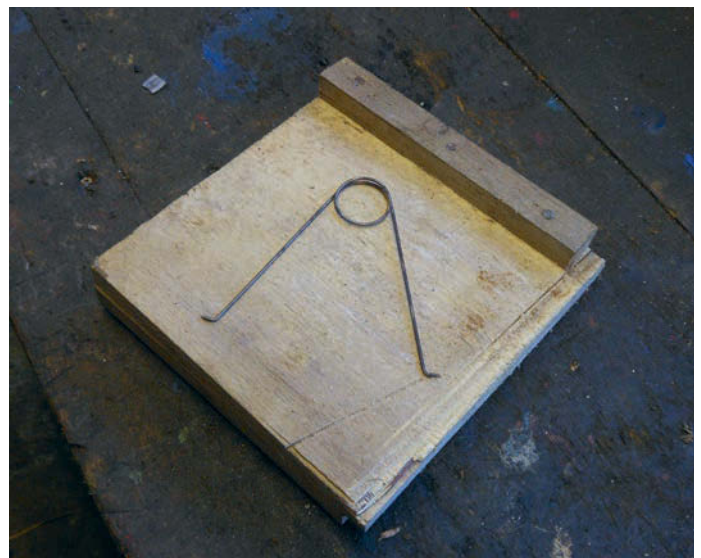
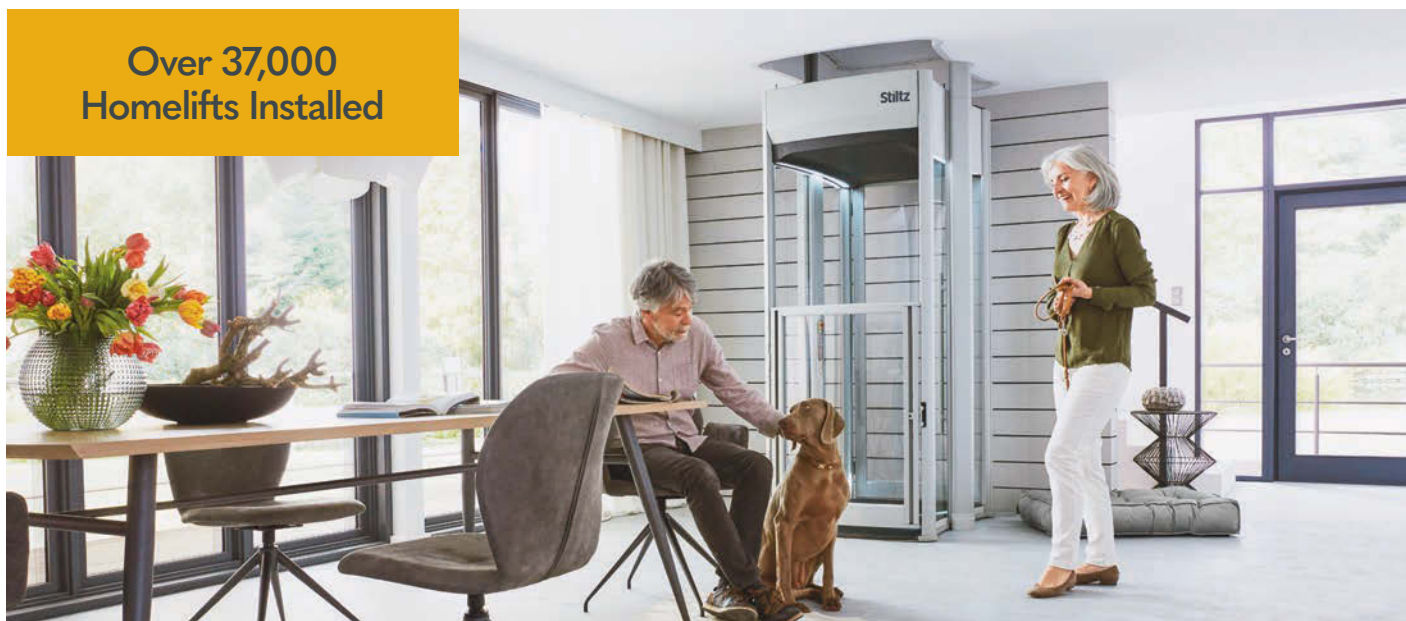


Photo 3: Thread cleaning spring.

Over 37,000
Homelifts Installed



Why have a ~~stairlift~~ when you can have a **real lift**?

Stay in the home you love with the UK's best-selling homelift.



Reconnect your home

Regain access to all areas of your home with a stylish, cost-effective homelift. Save the cost and upheaval of moving and maintain your independent lifestyle with a Stiltz Homelift. It allows you to travel easily and safely between floors without any of the hassles of a stairlift.

Peace of mind

Buy with confidence directly from Stiltz, the UK's largest homelift provider and you can sit back and let us reconnect all the areas of your home.

-  Fit in any home
-  Quick and easy installation
-  Low energy use
-  Quiet as a whisper
-  Safety as standard
-  We handle everything

Free,
no obligation
home survey

Have a chat with our friendly
UK-based team about your Homelift



0808 159 6695



stiltz.co.uk

StiltzTM
Homelifts



Photo 4: The spring in use.

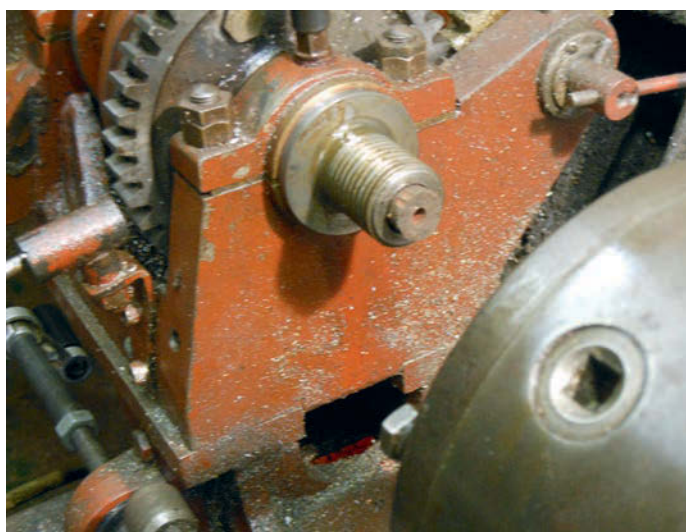


Photo 5: Morse taper plug fitted.



Photo 6: Swarf removal kit.

SWARF REMOVAL

Removal of machining swarf as it is being produced should never be done with the fingers, no matter how tempting it looks. Now don't speak to me of 'grandmothers and eggs' you well know you have just 'flicked it off out of the way'. Well don't! More bent wire welding rod and an old paint brush will prevent any accidents. Kept close, handy and within easy reach on or beside the lathe there is no temptation to put fingers where they don't belong and have no business being. ●

Calliper Conundrum

Derek Spedding came up with a solution for making measurements in awkward small spaces.



Photo 1: Drat! The mill head is in the way of the callipers again!

Trying to measure the thickness of work in a small mill can be a problem due to the clearances available, **photo 1**.

To take measurements with a calliper or a micrometer it's either raise the head and risk losing your datum or wind out the table and again risk losing the datum.

I happened to have a spare digital calliper so I thought I would try and doctor it to be able to get in below the milling head and easily take measurements. A few years ago I had one that failed and remember that it cut quite easily with a hacksaw, but I can't recall quite why I had to cut it up.

Thinking that it would be easy to re-drill the end-stop holes lower down the shaft and then cut off the waste would be a doddle. I burnt out or broke three 1.5mm drills before I gave up and had to think of another way of



Photo 2: Machining the new end stop from plate.



Photo 4: Calliper after modification.

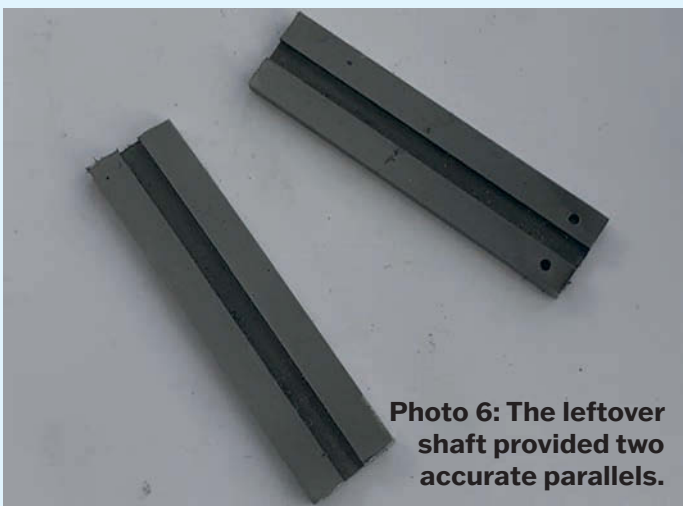


Photo 6: The leftover shaft provided two accurate parallels.



Photo 3: The new stop was made to be a close fit.



Photo 5: It fits!

stopping the reading head coming off the end of the calliper once cut. Obviously, this one was made out of tougher stuff than the earlier one, but I still managed to just about cut it with a good hacksaw blade.

The only way I could see was to make up an end stop and glue it in position with two-part epoxy, **photo 2**. This worked well as I made it a very tight fit on the shaft, **photo 3**, and with a small amount of epoxy it turned out very solid. The end stop was now bigger than the original so I had to cut off the thumbwheel bracket so I could get the full movement that I required, **photo 4**.

I can now measure up to 0.750" without lots of hand wheel winding and the risk of losing the datum has been eliminated, **photo 5**.

As an added bonus I cut the leftover shaft in half and made a nice pair of parallels for my machine vice, **photo 6**. 🍷

A Tangential Flycutter

Robert Walker works out the angles to make a fly-cutting toolholder.



Photo 1: Tangential Fly Cutter.



Photo 2: Milling the slot.

I have been using the tangential Diamond tool holder manufactured by Eccentric Engineering for some time now with a great deal of satisfaction. I was previously using a small boring head as a fly cutter with a modicum of success. I believe that it was lacking in weight and rigidity. A bit of reading led to the idea of making a tangential fly cutter. I chose a piece of scrap steel 20 x 33 88mm as the body. The shaft is 16mm round steel to fit into a corresponding collet, **photo1**.

I originally acquired my tangential Diamond Tool Holders for the lathe because I did not have a quick-change tool post at the time. I make my own tools out of high-speed steel and the tangential holders make adjusting the tool height very easy as opposed to mucking about with shims.

The nature of a tangential tool means the cutting forces are transferred down the length of the tool rather than across it so has much greater rigidity. Any gain in rigidity is a big advantage when using smaller machines.

Sharpening is also easier than with a standard tool as there is only one face to deal with. The tool is sharpened so that the face created on the end of it diagonally from one corner to the opposing corner is at 30 degrees to the horizontal when it is held vertically, **fig. 1**. A simple jig can be made to facilitate this.

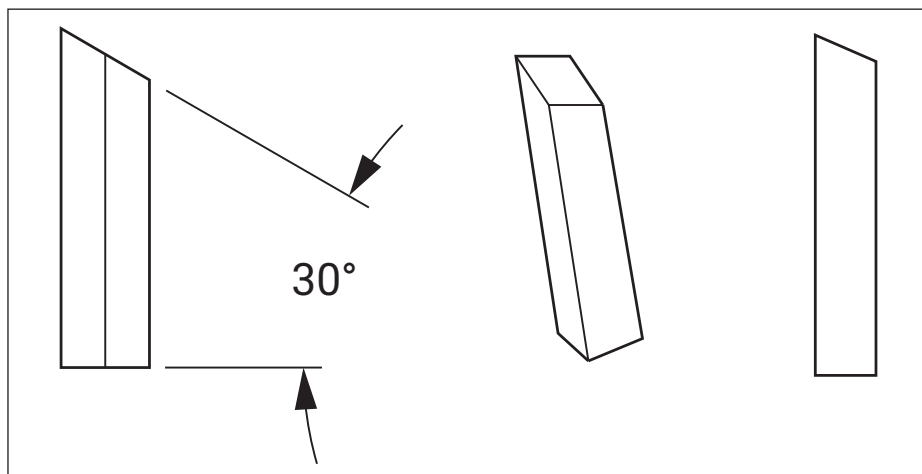


Fig 1: Tool sharpening Angles

I use the same sharpening jig that I use on my lathe, which came with my Diamond tool holders.

The fly cutter gives a smooth finish and reasonable depth of cut. It suits my Busy Bee mill which is only one horsepower quite well.

The tricky bit was calculating the angles. The tool must slope 12 degrees towards the head stock on a lathe or the horizontal in the case of a fly cutter used on a vertical mill. It also slopes at 12 degrees to the arc of rotation on both a lathe and a fly cutter. The 12 degrees to the horizontal is easy enough. However, while the angle to the arc of rotation is 12 degrees, the angle to the body of the fly cutter

has to be calculated for machining purposes. The arc of rotation is not a physical thing that can be machined. This is where Mike from Mikes Workshop came to the rescue. See Mike's Workshop at <https://tinyurl.com/439askdm> or use the QR code.





Photo 3: Three holes drilled and taped for 4 mm grub screws.

You can use a piece of paper and pencil, but I used FreeCAD, **fig. 2**. First the outline of the holder was drawn then the arc of rotation of the tool tip around the centre point of the holder. In my case the arc of rotation radius was 35mm. A tangent was then scribed against this circle at the point where the circle cuts the body of the fly cutter as this point represents the



Photo 4: Boring the hole for the shaft.

tip of the cutting tool. You can check the accuracy of this by scribing a line from the centre of the circle through this point and making the tangent 90 degrees to it, all of these lines should intersect. This is approximately where the point of the tool will be, it may not be exact, but it is close enough. Another line is drawn at 12 degrees to the tangent and then the angle of that line to the horizontal measured. In my case it was 16.61 degrees. That gave me the angle of the slot to be milled for the tool to the end of the fly cutter which I rounded to 17 degrees.

To mill the slot in the base of the holder the stock was set up in a



Photo 5: Edges rounded off.

four-jaw vice which was mounted on a rotary table. The 12 degrees to horizontal was achieved using a digital protractor, while the 17 degrees to the end of the fly cutter was done using the rotary table, **photo 2**. The slot was milled with a 6mm slot drill and then slightly enlarged to take the 1/4" tool.

Three holes were drilled 3.3 mm and tapped for 4 mm grub screws in the end of the holder to secure the tool, **photo 3**. The holes are located just below the centre to ensure that round tools, if used, will be secure.

The base was held in the four-jaw chuck on the lathe and a 16mm hole drilled and bored to take the shaft, **photo 4**. The shaft was bevelled on the lower end to facilitate welding to the bottom side of the base.

The edges of the base were rounded using a file, **photo 6**, completing the job. 🛠️

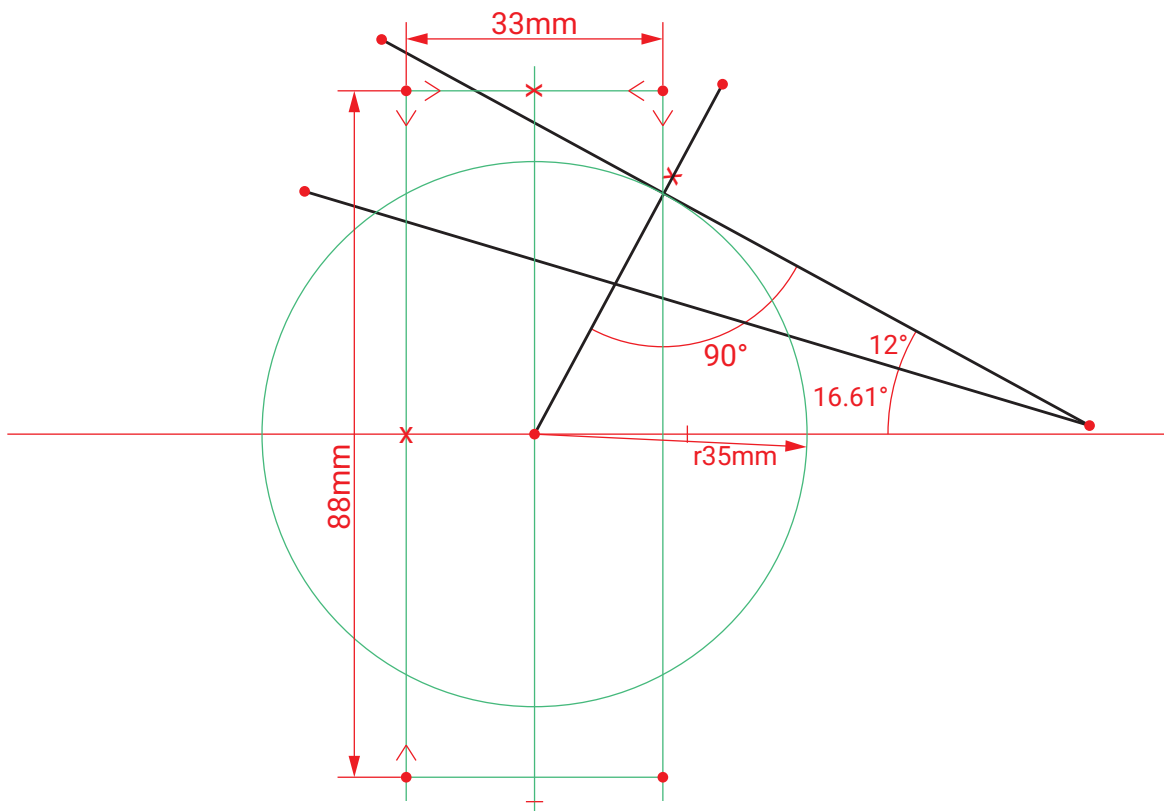


Fig 2: Tangential Fly Cutter Angle Calculation

Readers' Tips



We have £30 in gift vouchers courtesy of engineering suppliers Chester Machine Tools for each month's 'Top Tip'. Email your workshop tips to neil.wyatt@kelsey.co.uk marking them 'Readers Tips', and you could be a winner. Try to keep your tip to no more than 400 words and a picture or drawing. Don't forget to include your address! Every month we'll choose a winner for the *Tip of the Month* will win **£30 in gift vouchers from Chester Machine Tools**. Visit www.chestershobbystore.com to plan how to spend yours!

A SOURCE OF ACCURATE PACKING MATERIAL

Our tip winner this month is John Wing, with a use for old number plates!

As a caravaner I have accumulated several old caravan number plates from when I have changed my car. They are a hard plastic, very accurate in thickness and make ideal sacrificial packing for machining operations or for use to avoid marking work when held in a Chuck or under a clamp.



Please note that the first prize of Chester Vouchers is **only available to UK readers**. You can make multiple entries, but we reserve the right not to award repeat prizes to the same person in order to encourage new entrants. All prizes are at the discretion of the Editor. General terms and conditions are at www.kelsey.co.uk/terms-conditions.



07927 087 172
modelengineerslaser.co.uk
sales@modelengineerslaser.co.uk

No minimum order for custom cutting in laser, water and plasma in steel, stainless, brass, plywood, plastics, copper, bronze, gauge plate, aluminium.

Over 46600 parts for many common designs such as:



- Duchess
- LNER L1
- Princess Marina
- Crab
- Virginia
- Lilla
- Invicta

Got a project you need parts for? Ask us!

We do custom cutting as well!

CAD drawings not essential, we can work from hand sketches.

**Models, vintage cars, tooling.....
we cover them all!**

STEAMWAYS ENGINEERING LIMITED

LIVE STEAM LOCOMOTIVES

FROM O GAUGE TO 10 1/4" GAUGE



Steamways Engineering Limited builds working live steam locomotives from Gauge '0' to 10 1/4", Traction Engines up to 4" scale and stationary steam and launch engines – all to a high standard,

We also complete unfinished projects, finish paint and hand-line them.

The renovation and repair of steam models is sympathetically undertaken.

To assist you complete your own projects, we manufacture individual parts to order including supplying a range of fully certificated and EC PV Regulations compliant silver-soldered copper boilers up to and including 5 inch gauge.

Visit our Website

www.steamwaysengineering.co.uk

email us on **info@steamwaysengineering.co.uk**

or telephone us on **01507 206040** with your requirements for a no-obligation quote or discussion.

Steamways Engineering Limited

Dovecote House, Main Road, Maltby le Marsh, Alford, Lincs. LN13 0JP

Call: 01507 206040



MIDLANDS MODEL ENGINEERING EXHIBITION

THE SHOW FOR MODEL ENGINEERS

**THURSDAY 15th to SUNDAY 18th
OCTOBER 2026**

Thursday - Saturday 10.00am – 4.30pm

Sunday 10.00am – 4.00pm

WARWICKSHIRE EVENT CENTRE



**BUY FROM NEARLY 40 LEADING SUPPLIERS
MEET OVER 30 CLUBS & SOCIETIES
WORKSHOPS & TALKS FROM THE EXPERTS
SEE HUNDREDS OF MODELS
OUTSIDE ATTRACTIONS - LIVE ACTION**

THE UK'S LARGEST MODEL ENGINEERING EXHIBITION



COFFEE SHOP

RESTAURANT

FREE PARKING

**TICKETS AVAILABLE ON WEBSITE OR ON
THE DAY OF YOUR VISIT:**

Adults: £14

Senior Citizens (65+): £13

Child (5-14): £5

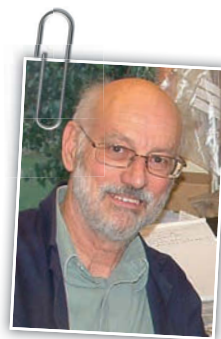
EXHIBITION LINK BUS

Running from Leamington Spa Railway Station on
Thursday 15th only. Charge is £5.00 each way.
Please see website for timetable.



www.midlandsmodelengineering.co.uk

The BR Standard 2-6-0 Class 4 Tender Engine



This month **Doug Hewson** makes a start on the cab.

PART 31

There is, of course, a laser cut kit for the cab parts, and this should be available from The Steam Workshop. Hopefully, there should also be a laser cut kit for all the extra bits and pieces. What I am starting on is the spectacle plate which I have shown in the flat so the dimensions will be correct for you to copy. The only thing that I can't be sure of is the shape of the boiler opening so I have left it to you to trim it to the shape as it needs to be as close fitting as possible, this needs cutting out with care. The next job is to make the back plate for the cab. Well, it is almost the back plate, but it is not exactly at the rear. Anyway, it is the plate behind the driver and fireman's seats. This will need the parts for the cab doors silver soldering on. I am afraid to say that I do not like to see engines running with the cab doors open, or worse still missing. It is not the done thing on a full-size engine so why should it be on a model, especially a 5" gauge one? But I love to see my engine left on shed with the cab doors left open, or even partly open. I think it gives an engine that lived in look about it.

We next come on to the two cab sides which are different of course. The left-hand side one has the drain cock lever on it, and the rivet holes for the reverser bracket. On the right-hand plate there are the rivet holes for the fireman's seat, and they are very slightly higher than that for the driver. I have drawn it out in the flat so that all the dimensions are correct and I have also shown the bend lines. At the left side of the first plate there are certain things which feel I ought to explain. There are two holes which are for the duplex valve spindles. These might seem a little large but there are tight fitting rubber seals around them which is to keep the draught out. There is a similar one just outside the bend line towards the top which is for the regulator rod to pass through, and just below the window are the rivet holes for the reverser stand. At the lower left corner are the rivet holes for the triangular box affair which is to protect the universal joint at the front of the reversing

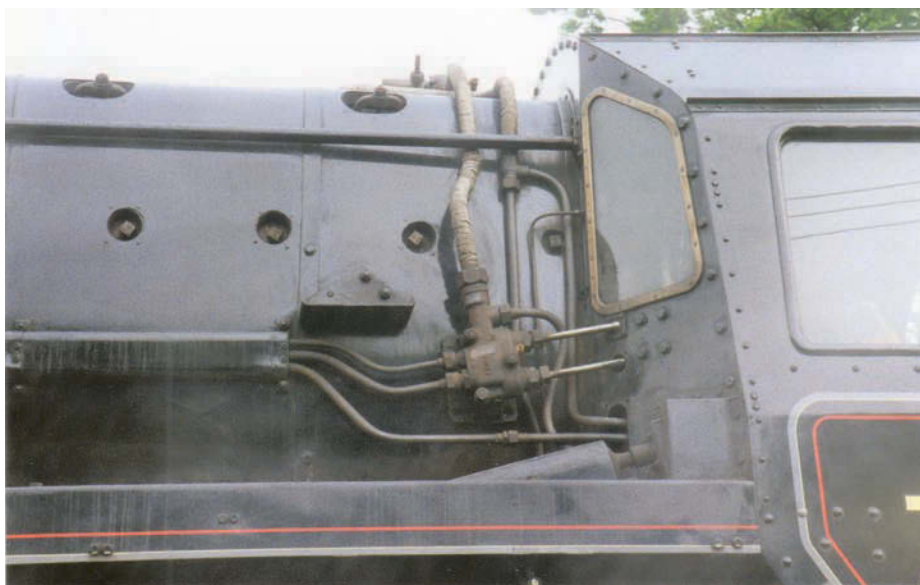


Photo 306: Duplex valve.



Photo 307: Drain cock.

gear box. Just to the right of that there is another elongated hole which is where the two pipes pass through to serve the sanding gear and the blower valve. I couldn't be sure about how bulky your cladding was going to be so on the laser cutting drawings I have left a bit of spare material around the opening. I took a photo of the left side of the engine cab of 76017 which is at the Mid Hants Railway as it is the only loco that I know of which is completely unadulterated since it left BR. I do hope that it is on view somewhere where it can be viewed so that any prospective builders can see it. **Photograph 306** shows most of what I have been talking about. Also worthy of note is the step part way up the firebox side which



Photo 308: Valves on right side of firebox.

has a triangular bolting flange, and of course the duplex valve. There is one lagged pipe which comes down from the manifold to feed the duplex valve and teed off the neck of that is a 3/32" pipe which serves the blower via the pedestal. There is a further pipe from the valve on the left hand end manifold and that pipe serves the steam brake. There is another pipe teed off there which serves the sanding valve, I think! This is common to all the BR Standard engines. There are two pipes exiting the front of the duplex valve, the small one at the top serves the small ejector and the larger one serves the large ejector plus there is also an additional pipe which enters the trunking, that being the blower feed. Note the positions of

Fig 122

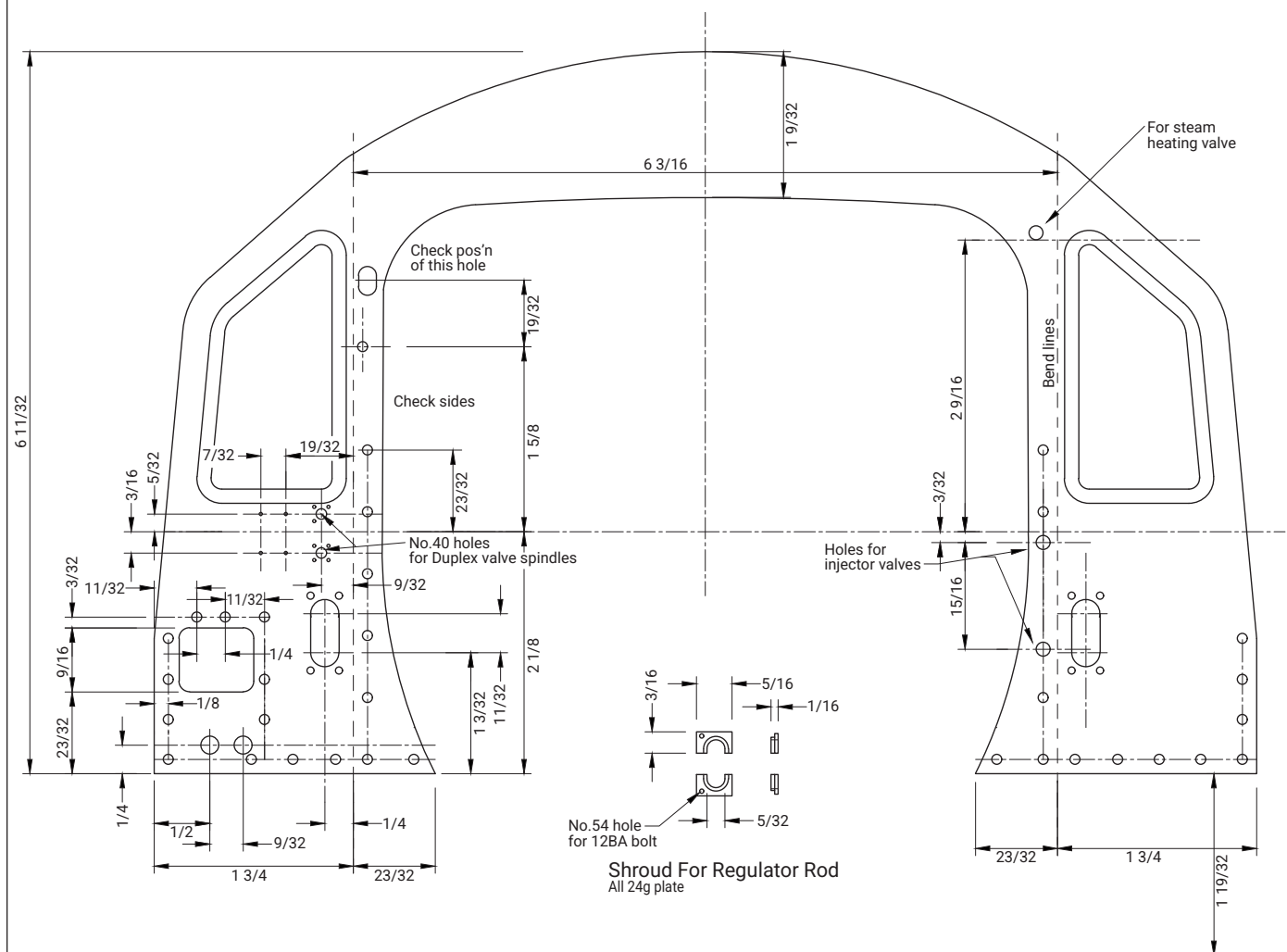


Photo 312: Arm rest hinges.



Photo 314: Fireman's arm rest.



Photo 315: Cab windows.



Photo 313: Drivers arm rest.

carriage warming valve to show where the pipe comes from but on my 4MT it then runs along the top of the tank where it terminates on the side of the smokebox. In the absence of any tanks, on your engine it runs along the top of the right-hand platform and terminates at the top of the steps. On both sides of the cab, I have shown the arm rests. The arm rests are simple to make even if a little tedious. They

are bolted into the cab sides, and they are the same on all the BR Standards. **Photograph 312** shows the arm rest hinges which I folded up from a piece of 20swg steel with a piece of 1/16" copper tube silver-soldered on to one edge, and then they were cut into the required lengths. The completed driver's side arm rest is shown in **photo 313** and **photo 314** shows the Fireman's arm rest.



The Silver Crest BR Class 1500

PART **6**

Mark Thatcher completes his build of this pre-painted and fully machined 5" gauge coal fired locomotive kit from Silver Crest Models

After last time out, I am pleased to leave behind the pipework & fittings which were not my finest of hours, and to be able to concentrate on adding the cab and water tanks to the loco, when finally, I will be able to appreciate the form and size of this beast. By the end of this month's article, I should end up with the completed loco, plus the various small details, lovingly referred to as locomotive jewellery. Also, I will have added my own little touches just to finish things off.

However, before I get down and dirty I thought I would mention a

handy little clamp I discovered on the web. This woodworker's clamp is the perfect profile to sit over, and engage with Silver Crest's display track and should act as a scotch to stop the loco rolling off the display base, **photo 1**. I have learned through some of the comments on my YouTube video build series that the name 'scotch' is a railway term that refers to blocks used across the track for this very purpose. Perhaps that is where the phrase comes from: ie. *to scotch a person's plans*. I don't know if it does but it kind of makes sense.

FITTING THE CAB

Photograph 2 shows the preassembled cab as I received it. I went for the BR lined black variant of this model as I think it looks more appealing with the red and white lining. These lines are actually decals which are hot-applied, and they are very good. You could be easily fooled into thinking the cab was hand-lined, as when you run your fingernail over them you can feel they are raised slightly. Of course they are lacquered to protect them after having been applied. The black top coat is a hard-wearing stove enamel finish which should stand up well



Photo 1: A clamp . repurposed as a scotch.

to the rough and (hopefully not) tumble when out on the line.

The cab is secured to the footplate with eight bolts from the inside of the cab, **photo 3**. I needed to clear the wooden planking from my own added footplate as I needed every millimetre to allow these bolts to screw into the threads in the metal footplate. In fact, I removed any wood that could interfere with the fit of the cab, as I wanted to make a metal-on-metal contact to ensure everything stayed square. I actually did not do this earlier in the build, and attached the cab reversing lever to the 2mm thick wooden floor, then into the footplate. That extra 2mm made all the difference as with the extra height the floor had created the whole reversing mechanism was too tight and was binding. Without this it was fine. Six bolts hold the cab in place from the underside of the footplate, **photo 4**. Notice also the thickness and quality of the pre-painted etched brass running numberplates, which have also been added.

3D-PRINTING THE COAL LOAD

I have a number of Ender Creality 3D-printers and I have to say, having used these to 3D-print various small items over the last four years, I don't know how I lived without these before.

Photograph 5 shows the process of 3D-printing a blanking plate for the coal bunker. I could have thrown some real coal in there when the loco was on display, but I wanted to keep the mess down to a minimum and to use the least amount of coal needed, so printed this plate so I could just drop it into place at the top of the bunker, then added some smaller scale coal



Photo 2: The cab and side tanks are pre-painted and lined.

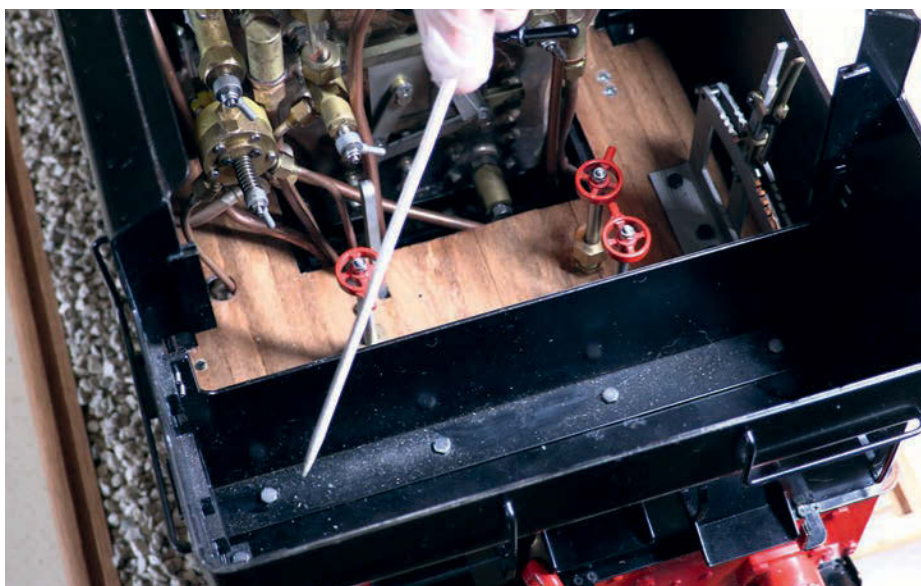


Photo 3: Securing the cab to the footplate from the top...

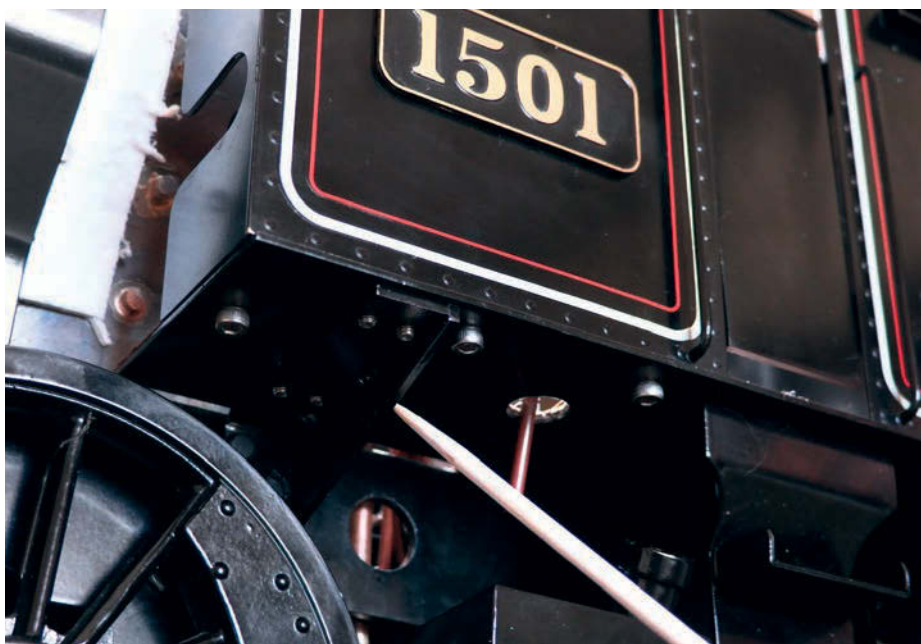


Photo 4: ...and from underneath.

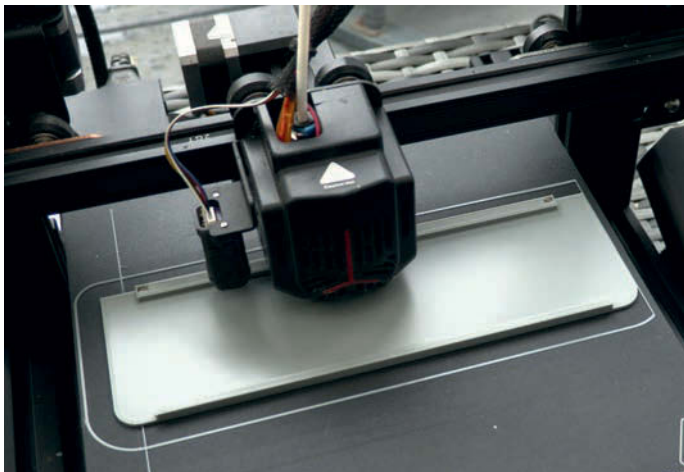


Photo 5: 3-D printing a coal bunker blanking plate.

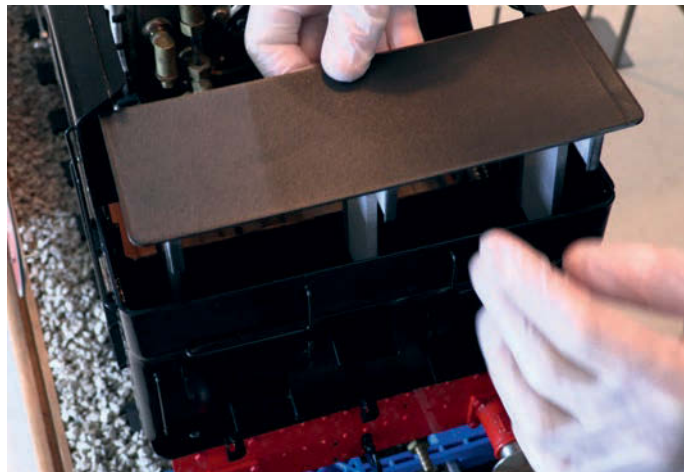


Photo 6: Test-fit of plate.



Photo 7: Scale coal is added for effect.



Photo 8: Fire box heat deflector.



Photo 9: Water tank bracket.



Photo 10: Location of water balance pipe.

to it, **photos 6** and **7**. I used a 50/50 mix of PVA 'dries clear' glue and water to secure the coal load into place.

The next job was probably the simplest of all: to add the two heat deflectors to either side of the firebox. These just slotted into place and were a loose fit. They would be held in position when I added the side tanks next, **photo 8**.

THE SIDE TANKS

The chassis came with the required brackets for the side tanks that were preinstalled. This is one of the few components that were supplied with crosshead screws rather than Allen bolts. I am not a fan of these fixings but suspect the reason for these was the limited clearance to get even ball-ended Allen keys onto the underside

of the tanks. However, I found it more practical to remove the side tank brackets from the chassis then attach these to the underside of the tanks. Then with these in place it was much easier to reattach them to the chassis with a long Allen key, **photo 9**.

Once these tanks were bolted onto the chassis from underneath, I could attach the water cross feed pipe assembly, **photo 10**. A word of warning



Photo 11: Installing fire box top over.



Photo 12: Securing the boiler to side tanks.



Photo 13: Removing cab door.



Photo 14: Securing the reversing lever to reach rod.

here as you need to be very careful not to overtighten the four 3mm bolts on each side that hold each union in place to the underside of the tanks. They need to be located squarely, and the pipe assembly does not easily allow for this. Attaching the assembly is made harder as whilst technically this part is asymmetrical, doubtless this would have been hand-adjusted to fit in the factory with a minor amount of bending to get it to do so. The problem is that it is total guesswork as to which way round it went. I had a 50% chance of getting it right which, luckily, I did. Had I not done so it would have been a huge hill of pain to upend the loco and somehow get to this assembly from underneath to turn it through 180 degrees.

Once the tanks were secured, I added the firebox top cover, **photo 11**. This was a snug, yet unsecured fit, being held in place by two strapping pieces, again using 3mm bolts. As I had already bolted the tanks in position from underneath, they had a habit of splaying out towards the top. I could have done

with a third hand to compress the gap between these and the firebox whilst attaching the strapping but fortunately had a friend to help. I figured out later that a set of woodworking clamps with rubber ends would have done the job, with a cloth in between these and the tanks to preserve the paintwork! I also found it easier to fully attach each strapping piece to one side tank, then when they were under compression to bolt the other side down, **photo 12**. Note also the handrail has now also been fitted to the smokebox.

REVERSER REACH ROD

This was the last mechanical component that needed to be attached. It runs from the reversing lever through the front right-hand side of the cab, down along the right-hand side of the loco and to the reversing gear. This cannot be fitted until the cab is in place. To get to the lever, the right-hand side cab door had to be removed, **photo 13**. It was an easy job, A pin holds it into

place which runs through a hinge and a spring, which keeps the cab door closed, but allows it to be pushed open and inwards from the outside of the cab. Once this pin was removed the reversing lever was accessible.

One end of the reach rod was inserted through the slot in the cab and then bolted onto the reversing lever, **photo 14**. It was worth one final check at this stage to see the reversing lever was installed the correct way round, with the lever itself being orientated facing outwards, and with the sprung selector lever facing backwards. The other end of the reach rod sits just below the right side tank and is secured by a bolt with a flange, so you can't over-tighten this assembly and cause it to bind, **photo 15**.

ADDING LOCO JEWELLERY

With no more mechanical machinations to deal with, I now had the very pleasant task of blinging

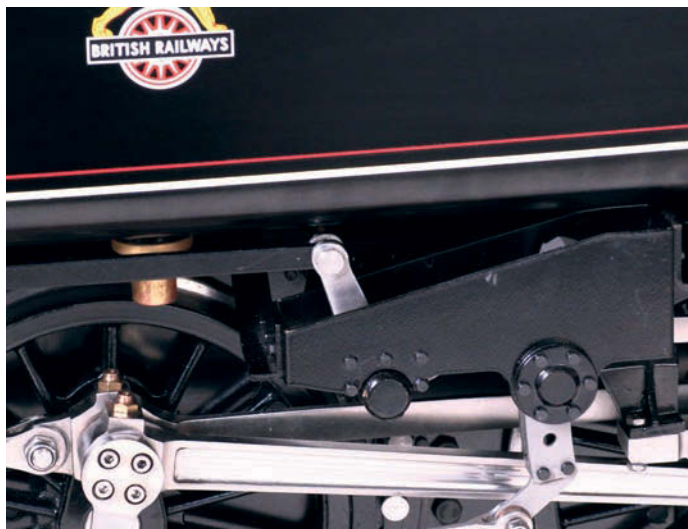


Photo 15: Reach rod connected to reversing gear.



Photo 16: Brass cab window spectacle plate.



Photo 17: Vacuum pipe and 3D-printed loco lamps.

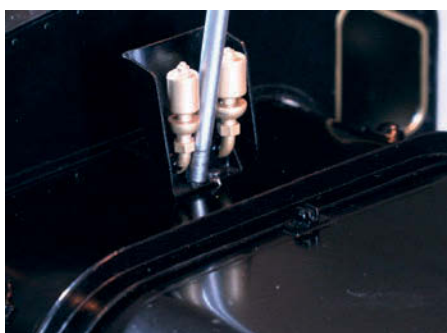


Photo 18: Fitting dummy whistle – the last component. Phew!

up the loco. There were lots of little details that were purposefully left until last, I guess, so that they did not get knocked, scratched or damaged. Four etched brass cab window spectacle plates were provided in the kit, **photo 16**. They go to the outside of the cab only, with the inside cab window surrounds left naked. It would have been nice to have another set for there. Please carefully note not only the orientation of these, but also where they go, as the rear spectacle plates are slightly (but not very) different to the front. Please don't use superglue to fit these! If it gets on your pristine paintwork, you've ruined it. I much prefer *Canopy Glue* from Deluxe Materials, which is sort-of a PVA glue on steroids! Once it is dry, the bond is very good, yet it dries clear and leaves no residue.

Photograph 17 shows the nicely detailed vacuum pipe which I repainted earlier in this build series, the central hook and screw coupling (two of each are also provided in this kit) and my own 3D-printed BR-style loco lamps. There are four lamp irons for these to the front of the loco and three to the rear. The positions of the lamps signify the type of train the loco hauls. For example, this lamp code signifies an

express passenger train, newspaper or breakdown train. If you want a fuller description of these codes just Google: loco lamp codes.

The last piece of loco jewellery to be added, and indeed the very last component in this kit, was the dummy whistle that sits atop the firebox top cover, **photo 18**. This provided a very satisfying end to a very enjoyable build. But was it worth it? Why would you not go the extra mile and for just another £500 grab the ready to run model? After all, given the overall cost of these models, it is not a huge hill of beans, is it?

POST-BUILD IMPRESSIONS

Well to answer this, I should firstly remind you that I was gifted this kit to build by Silver Crest. That being said, all opinions expressed in this build series have been my own and I remain totally impartial in my views. I can't categorically answer the above questions but can share my honest experiences with you. If I had to buy either the ready to run or kit version, I would probably have opted for the former as I am generally cash-rich (no, not *that* rich) and time poor.

However, I have had positive experiences with this kit in three areas:

1. Satisfaction. I do not have the prerequisite skills to scratch-build something like this, nor the machine tools to do so. Notwithstanding this, the level of satisfaction I have had throughout this whole process has been worth far more than buying an RTR kit and sitting it on a display plinth just to admire.
2. My learning curve has been steep yet immense. Yes, I had a little prior experience in the smaller gauges but nothing on this scale. I still have the propensity to get my component nomenclature wrong, and am still learning, yet when I look back to August last year when I received this kit, I can't believe the knowledge I have picked up along the way.
3. The response I have had from the model engineering community has been largely positive. Yes, there are the few who don't take you seriously unless you make your own screws, but overwhelmingly I have been welcomed into this world with open arms, by people with more experience than me (i.e. everyone) who are always willing to share their knowledge.

So, having a loco that I can say I built (well kind of) is great, but does it actually work? Well, I don't know just yet, but please join me next month and we will find out together. Meantime for a deeper dive into this build, please drop into my YouTube channel: **MADforSTEAM**, and if you like what you see and hear, please like and subscribe to it. It will cost you nothing but helps me out massively. We now have over 160,000 views and rising. I suspect when this article hits the page, we will be closer to 250,000! Until next month, happy steaming!

To be continued

MARKET LEADER IN
FULLY MACHINED LIVE
STEAM KITS

NEW! OUR 5" GAUGE BRITANNIA IS NOW AVAILABLE AS A FULLY MACHINED KIT!



Pre-production model shown

£13,995.00 + £195.00 p&p

"What a thoroughly enjoyable experience it has been to build the GWR 15xx kit. May I take this opportunity to thank both you and Mike. It has enabled me to get involved in this amazing hobby in my mid-70's"
A.S. Worcestershire

The Advantages of Kit Building

The success of our GWR 15xx kit model clearly demonstrated that our customers love the idea of building their own model. Self-assembly provides a great sense of achievement for the novice and is a real time saver for the experienced model engineer who may not have the time for another scratch build. By assembling the model you will learn how a live steam engine works, providing confidence when running and maintaining the engine over the years to come.

Complete and Fully-Machined

Our kits are fully machined and include everything you need to complete a working live steam locomotive. There is no drilling, soldering, or machining of any sort required. Every single one of our kit models is trial assembled at the factory before being disassembled and packed for shipping - your guarantee of quality. Complex assemblies e.g. cylinders are supplied pre-assembled and the boiler comes with the back head controls fitted. You will receive a comprehensive instructions book with illustrations and enjoy access to a telephone helpline should you need advice during the build. We will ask Mark Harris to create a video series showing a kit by kit assembly as a guide to your own build. His GWR 15xx videos attracted over 150,000 views!

Summary Specification



Length approx 77"

- Coal-fired
- Sprung axle boxes with needle roller bearings
- Two safety valves
- Silver soldered copper boiler
- Etched brass body with rivet detail
- Available in choice of names
- Painted and ready-to run
- Stainless steel motion
- 2 Outside Cylinders
- Walschaerts valve gear
- Piston valves
- Mechanical drain cocks
- Mechanical lubricator
- Reverser in cab
- Boiler feed by axle pump, and hand pump
- Length 77"
- Width 10"
- Height 14"
- Weight approx 120kgs

The 5" Gauge Britannia Model

This coal-fired live steam model is built to a near exact scale and is an excellent representation of the full size locomotive. The kit model is supplied with the regular BR1 tender and you can select the name and number of your choice. The copper boiler is silver soldered, hydraulically tested to twice working pressure, and supplied with a shell test boiler certificate. Every model benefits from a full 5 year warranty.

The manufacture of the kit version of this model is presently scheduled for completion December 2026.

High quality kit models are expensive to manufacture and the cost of raw materials is spiralling ever higher on a weekly basis. However, once you have paid your deposit your price is guaranteed. We are pleased to offer this kit at the fantastic value-for-money price of just £13,995.00 + p&p. The model can be supplied built and ready-to-run for an extra £1,000.00.

Save £195. We are pleased to offer free UK delivery for any order received within 28 days.

Delivery and Payment

The order book for the 5" gauge Britannia kit is now open and we are happy to accept your order reservation for a deposit of just £1,995.00.



We will then request a stage payment of £5,000.00 in September 2026 as the manufacture progresses, a further payment of £5,000.00 in November 2026 and a final payment of £2,000.00 on completion of batch presently scheduled for December/January.

Please send, without obligation, my free 5" gauge Britannia colour brochure.

Name: _____

Address: _____

Post Code: _____

Please send to: Silver Crest Models Limited,
2 Gresley Close, Daventry,
Northamptonshire NN11 8RZ

MEW

Company registered number 7425348

Request your free brochure today

Request your free brochure today by e-mail, telephone, or by returning the coupon opposite.

Telephone: **01327 705 259**

E-mail: **info@silvercrestmodels.co.uk**

Find more information at

www.silvercrestmodels.co.uk

FREE
BROCHURE
REQUEST FORM

These articles by Geometer (Ian Bradley) were written about seventy years ago. While they contain much good advice, they also contain references to things that may be out of date or describe practices or materials that we would not use today either because much better ways are available or for safety reasons. These articles are offered for their historic interest and because they may inspire more modern approaches as well as reminding us how our hobby was practiced in the past.

By GEOMETER

Beginner's Workshop

USING SUB-FACEPLATES

THE NORMAL faceplate supplied with a lathe provides means of setting up components with flat bases or ends, the components being held by bolts through the plate and clamps on the front or by studs or setscrews passing through the plate and screwing into the components. For special jobs additional holes may be drilled in the faceplate and spigot and dowel holes can be used for locating purposes.

Nevertheless, to work conveniently on a faceplate, components need to be above a certain minimum size. If they are small-but still of a type best set up on a faceplate-they cannot be bolted direct owing to the size of the boss and spindle, so clamps must be used and these are necessarily large and often out of proportion, and may

even cause serious obstruction to the use of tools.

Again, there are many old lathes with solid spindles on, which it is not possible to employ the drawbolt principle-using a long bolt right through the spindle to hold a component on to a faceplate or jig at the front. Consequently, here too there is a handicap on some classes of work.

In both cases, however, the solution is to use a sub-faceplate, which in principle is merely a flat plate on which components can be attached in whatever is the most convenient way - the plate itself either being held in the chuck, or mounted on the normal faceplate. And with the sub-faceplate projecting from the normal faceplate there is a flat face and access to the rear for fitting and tightening bolts and nuts used for holding components.

Most normal materials can be used

for sub-faceplates in the form of parallel discs for holding in the four-jaw independent chuck, or flat rectangular bars-for similarly mounting - or attaching to the normal faceplate. Aluminium alloy, brass, and mild steel can be used; and the most convenient thicknesses are 1/4 in. to 3/8 in. If desired, a simple casting could be obtained from a wood pattern and machined.

At A is shown a parallel disc mounted in the independent chuck-jaws reversed-for a small component to be clamped by its flange to the front. To ensure true running the disc should be faced after mounting for which reason soft material like aluminium alloy is best.

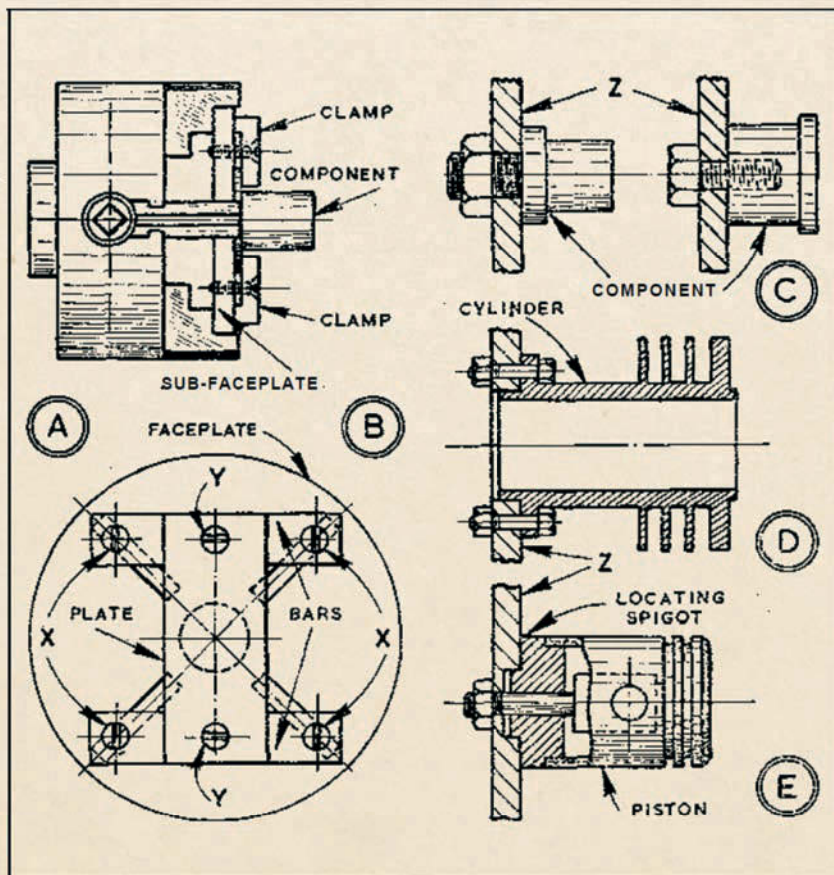
Countersunk screws for the clamps minimise obstructions at the front; and instead of the screws screwing into the plate they can be spaced between the chuck jaws, pass through clearance holes in the plate and be provided with nuts on the back. In setting up the clamps are only partially tightened until the component is running truly.

Small component set-up

At B appears a plate mounted on the normal faceplate. Two flat bars about 3/4 in. square are attached to the faceplate with countersunk screws, X. Then the sub-faceplate is attached to the front with screws, Y, which pass through the bars, and the normal faceplate (holes being drilled) and are provided with nuts at the back. Again, the sub-faceplate can be faced true for mounting components.

At C, D and E, where the sub-faceplate is marked Z, are typical set-ups of small components. For any pedestal-type part, the plate can be centred and drilled from the tailstock, the hole chamfered at the front, burrs filed off the back; then the component can be mounted with a nut. For a component with a tapped base, the preparation can be the same-then a setscrew used for holding, or a short piece of studding and a nut.

For a small engine cylinder the plate can be bored through, then holes drilled for mounting the cylinder by its flange-when the bore is to be machined or ground. For a small piston, the drawbolt principle can be adopted. A locating spigot should be fitted to the plate, then a stud screwed into a block which is drilled crosswise to take the gudgeon pin.



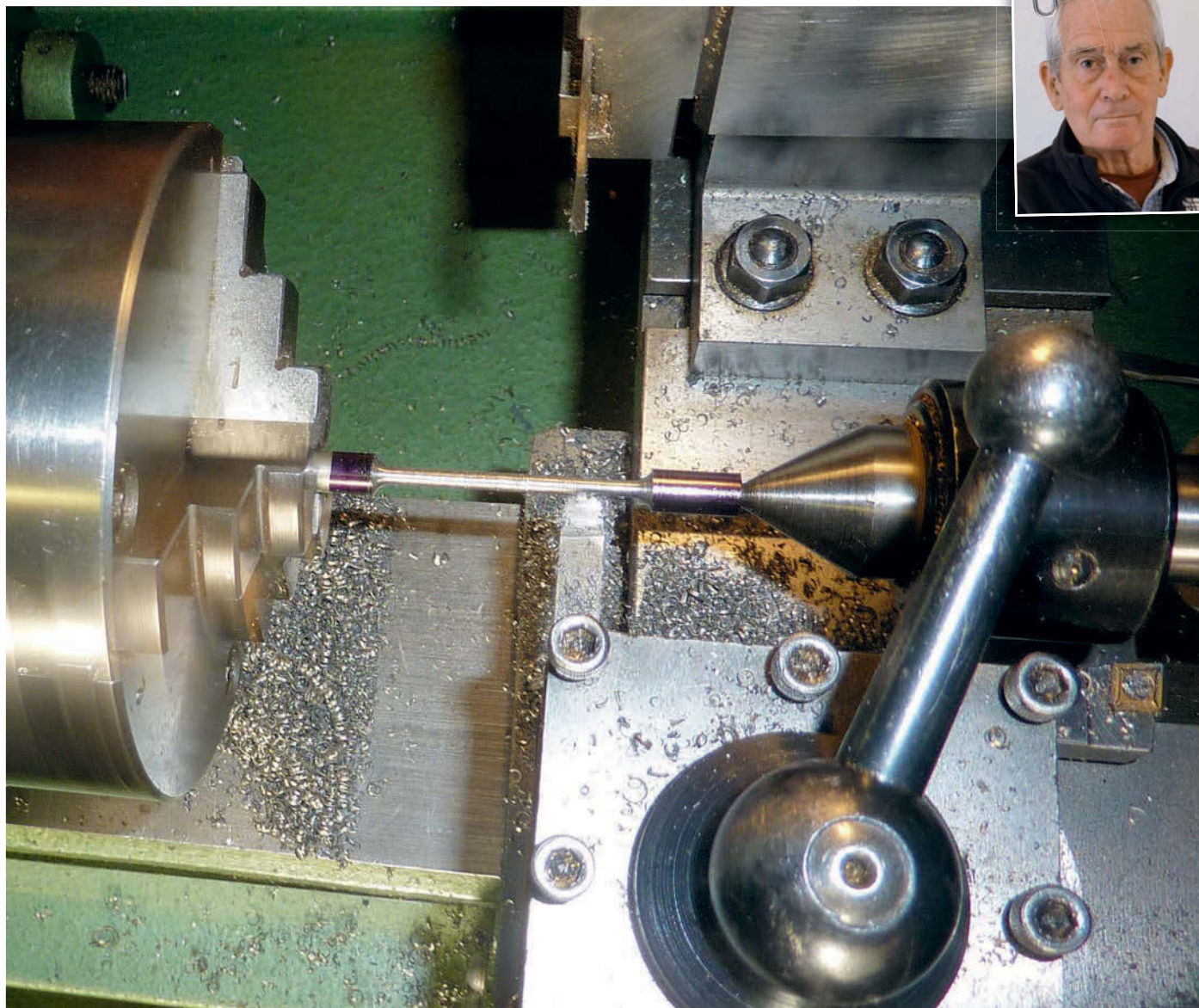


Photo 6: Turning down an embryo link.

Improvements to a Pannier Tank

PART 2

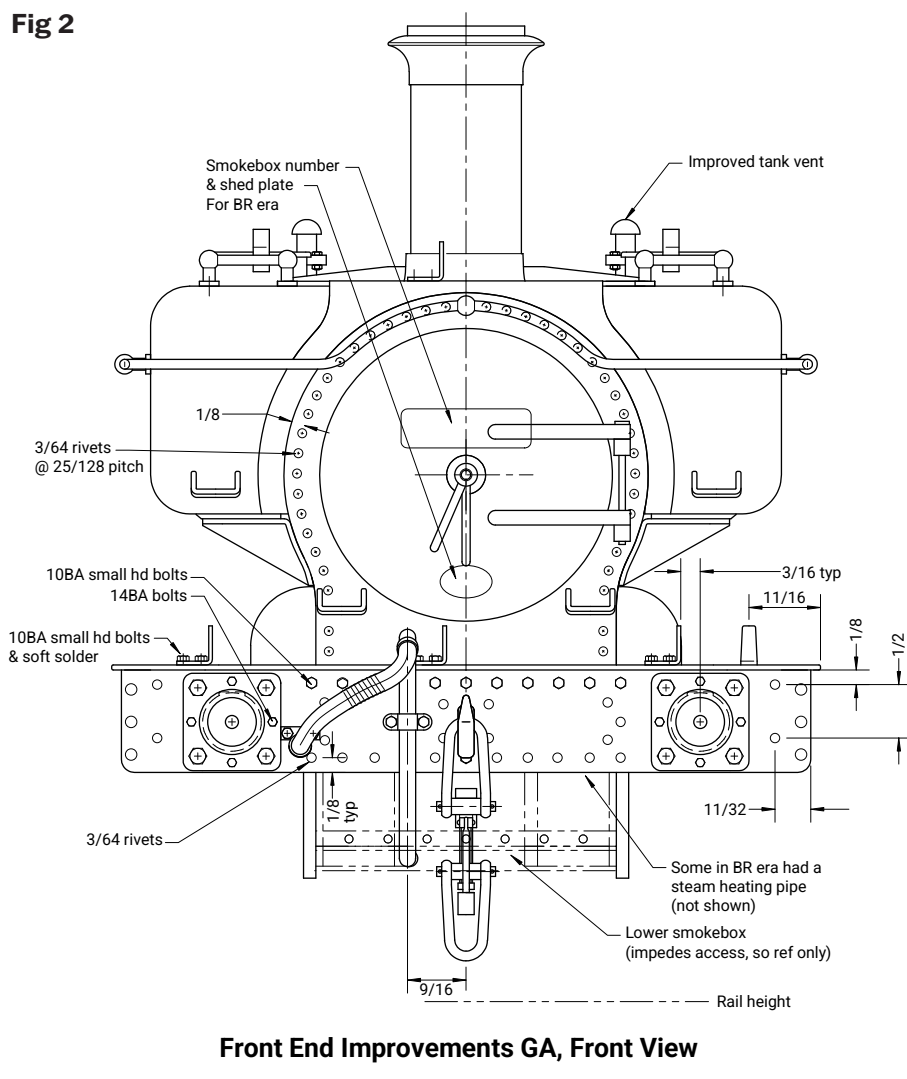
Gerald Martyn explains to improvements made to the front end of his 3 ½" gauge locomotive.

I like to think that I got the proportions of the model just about right, it looks that way to me, anyway. This should be the case as I worked from an original G-A drawing and a selection of photographs. These engines, like most, evolved over time so if looking for exact scale it's best to pick a set of photographs and adapt your work to match what you see. These days this may well be the preserved engine, 1369, but be aware that this is

as it is now and not in the same state that it was on the 'real' railway. The polished brass safety valve bonnet is a dead giveaway. When I searched around, I was unable to find any usable photographs of these engines after the works photos of 1934 until they escape to the wild west country at Weymouth and Wadebridge (what a string of W's!), to become minor celebrities in BR days. So, when it comes to the paintwork there's a bit of a blank period.

This could be considered an advantage because any GWR scheme can be used and nobody will be able to say it's wrong! Now to the cosmetic 'improvements, starting at the front end, **fig. 2**, with its side view, **fig 3**.

For the model there are lots of rivets and bolts that can be added. We are limited in what we have available, and I've tried to pick what I think are visually the best head size from the fasteners available to us. Starting with

Fig 2

the buffer beam, these are nearly all 'cosmetic' so do not carry load and can simply be stuck into plain holes using Loctite or whatever, so no broken taps to worry about. The round heads spread around are all 3/64" rivets, representing round head bolts. In service and over time some buffer beam round head bolts became hex head and some hex heads became round heads or studs, so choose your period and picture and make it look like that. Around the smokebox there is a prominent row of rivets 1/8" in from the edge in our scale and pitched at 25/128" (that's a smidgen over 3/16"). I suggest using 3/64" rivets, but what may look better would be to put them at 0.25" pitch. This would give the correct head to space ratio and may look better to the eye, but of course rivet counting nit-pickers will complain. The choice is yours. Either way this size gives a differentiation between these and the smaller rivets to be used extensively for the plating. There is a matching line around the outside of the 'box which only show below the tanks. These are at the same pitch but

note that they do not align with the front set because the overall distance around the outside curved surface is greater than on the front face. In all cases bashing down the tails is a bit tricky but can be done using bits of bar to take the hammer blow to the rivet, and an extra pair of hands may help. I've not fitted any of these, by the way, as there are other projects I want to do in what remains of my life.

Other bits to consider are the lamp irons, which are pretty simple and being able to fit lamps is worthwhile. They can be made from brass and held down with a couple of 10BA Hex screws each. The real engines nearly always seem to have lamps somewhere and being painted white they do stand out. Below and behind the buffer beam there should be a lower smokebox panel which is part of an enclosure for the valve chests. This lines up with and was part of the smokebox front and restricts access to the steam pipes and lubricator clack, so I suggest it's ignored as it's not too prominent on the real ones. If fitted, then a quick removal system is advisable.



Photo 7: Links with holes lined up using 3/32" rod.

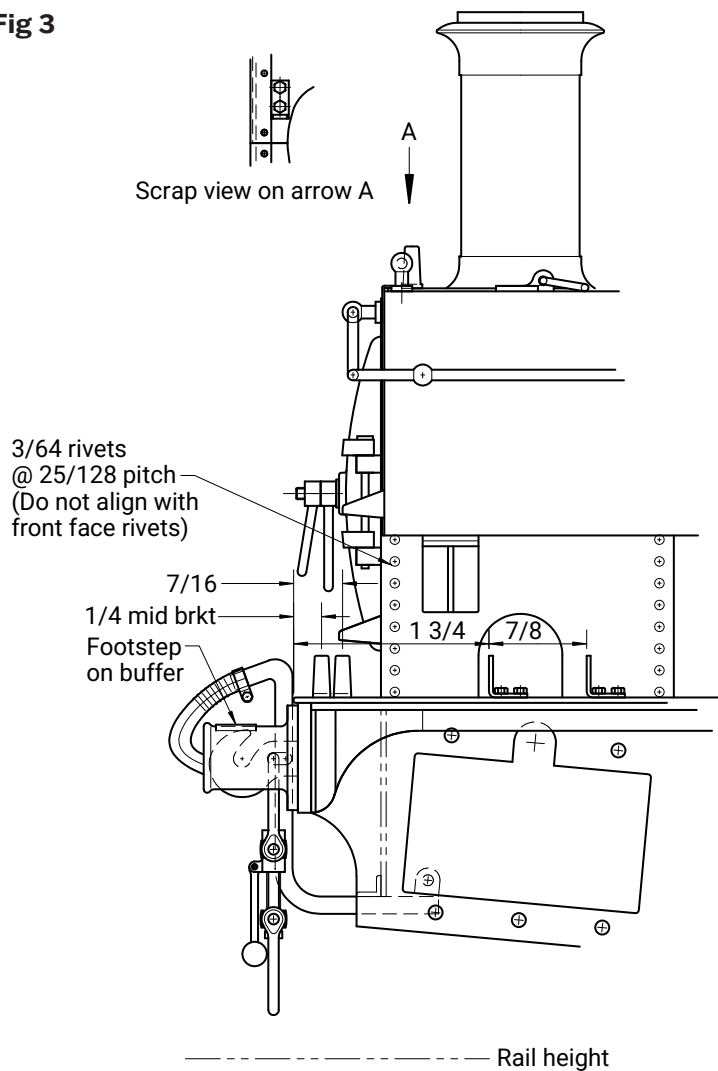


Photo 8: Annealing the links to remove spring back.

The couplings represent the GWR design which is rather more complicated than the LSWR ones I've done in the past. They are not intended for use, just for appearance. This is not to say that they're not strong enough as a quick calculation gives a strength in excess of 500lbf if made from a good quality mild steel, which sounds sufficient. It's just that we probably don't have a good idea what the strength of the steel is as our suppliers don't normally issue certificates of conformity. Chain couplings also allow the engine to to-and-fro making it more difficult to drive and this also allows snatch loading. Stick with bar couplings for pulling loads is my advice. Like the tool boxes and some other items they can be considered satisfying little model projects in their own right. The drawings for them are in **fig. 4**. Note that I don't provide every last dimension, but enough for an experienced builder, which you now are if you've come this far, to be able to fill the gaps.

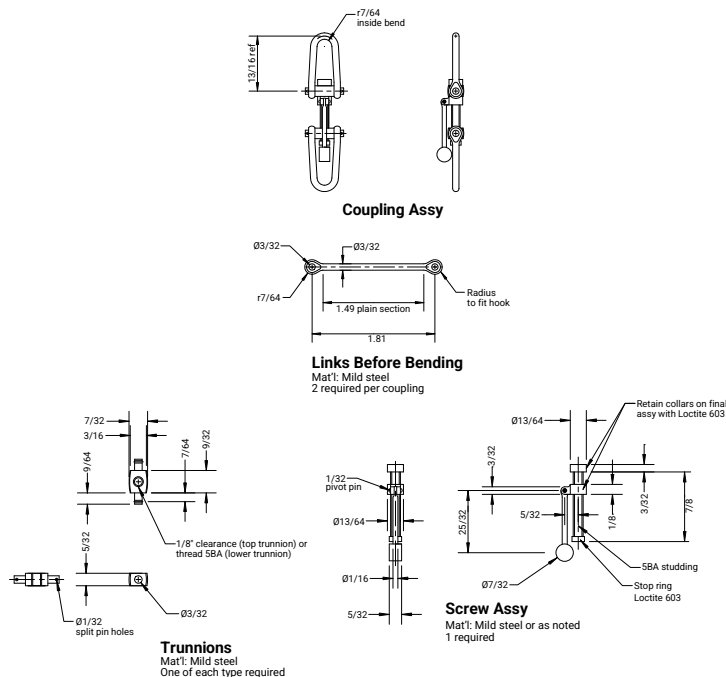
Starting with the links; these can be turned from mild steel bar between chuck and centre, **photo 6**. The eye ends are then filed to shape, and to fit through the slot in the coupling hook and drilled. Bend them around a bar with heat and lots of trial and error and don't forget the slight kinks to square the ends for the pivot. Get the ends to roughly the right spacing and line the holes up using a 3/32" bar as a guide, drilling through again if required to

Fig 3



Front End Improvements GA, Side View

Fig 4



ensure they swing freely on it, **photo 7**. The trunnions, if not to be used for pulling, are best made from square bar, drilled and parted to length in the lathe and then a piece of 3/32 bar silver soldered through. Finish to shape, drill and tap etc. and drill the split pin holes (I covered my cross-drilling method in Part 7 of the original series). Open the links out just enough to fit the trunnions and then squeeze the eye ends together, not forgetting put the hooks on where necessary. To remove spring-back grip across the eyes in a vice and heat the bend to red hot, **photo 8**. Fit 1/32" split pins to keep the eye ends in place but in order to look their best the rather oversize eyes in the pins need to be reduced by squeezing around a 1/32" drill shank first. The screw is 5BA with glued fittings. The lever cum drop-arm is made from a piece of 1/16" bar hammered down (hot) to half thickness to spread it for the pivot hole, with a round bar offcut for the weight. The finished parts are shown chained together, so to speak, in **photo 9**.

The vacuum pipe standard, **fig. 5**, is simple enough, just a piece of bar with the swan neck bit notched, bent over, silver soldered and then filed to shape. I used 5/32" mild steel bar because I had some, but any material that takes solder will do. The notch needs to have an included angle of 110° to give the correct 'droop' angle. Again, heat was required during bending to prevent the metal cracking. Pickling in citric acid sorted the oxide before soldering. A nice blob of solder gives something that can be filed to shape and note this should look like just a bit of tightly bent pipe with no lips or flanges as some railways use. The attachment bracket was cut and filed from steel bar and fixed with Loctite. Just this one bracket does not give much stability, so a further attachment uses a piece of sheet to form a lug to attach to the lower front steam chest stud. To attach this to the bar in the right place I cut a slot with a hacksaw then assembled up in-situ with some Loctite in the slot and left it to set. But before this the



Photo 9: Finished couplings.



Photo 10: Bush repair after grinding out a broken tap.



Photo 11: Vacuum pipe standard.



Photo 12: Standard installed with dummy pipe.

holes in the buffer beam need to be drilled and tapped. Oh dear! I broke a tap. It's been said that spark eroding is the best way of removing the broken bit, but I don't have the kit. In the end I ground it out with a tungsten carbide burr. This left an oversize wonky hole which I adjusted back to centre with the burr and drilled out to 5/32". I then fitted a brass bush ready tapped 10BA, **photo 10**. With more holes yet to tap this mess got me thinking. A quick sum using the shear strength I reported in Part 8 of the original article showed that a 1/8" diameter bush held in with Loctite 603 would roughly match the strength of the 10BA bolt. Certainly good enough for these cosmetic parts. Eureka! It's easy to produce the bush(es) in a lathe and a broken tap is less likely and inconsequential anyway, so the remaining holes were done this way and a nervous breakdown deferred.

Fig 5

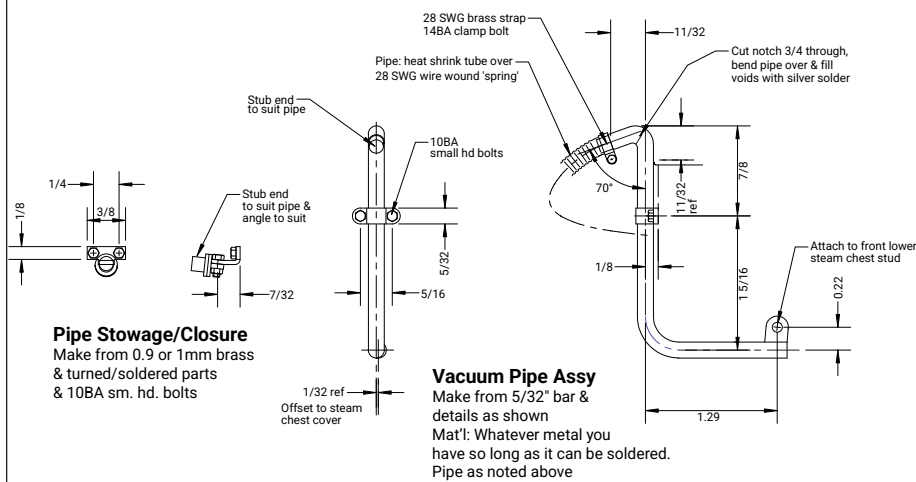
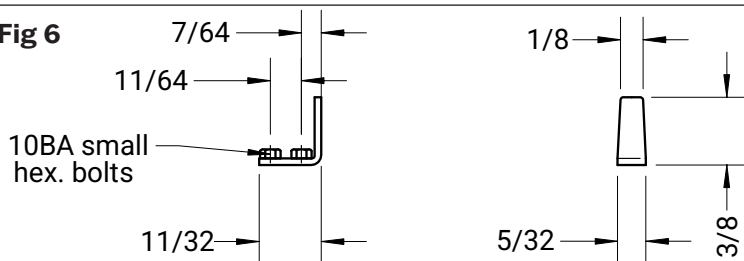
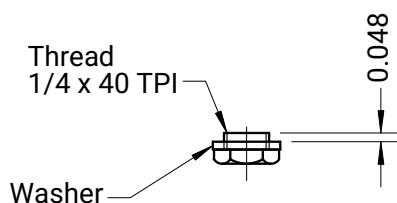


Fig 6



Lamp Irons

Mat'l: 0.9mm brass, 6 off



Hand Pump Clack Access Bung

Mat'l: 5/16" hex brass & fibre washer, 1 off
Position directly below pump clack

Glued-in threaded inserts are not new, of course, but are more usually used in soft materials and composites so possibly new in this application. The finished standard is shown in **photo 11**. The flexible pipe is simply a piece of heat-shrink tube, as used in electronics assemblies, around a fine wire spring. For heating I just use the hot air above a gas torch; no need for a special heater for such a rough and ready occasional job. If the tube melts, then just replace it and keep the torch further away next time. The fairly stiff and unpromising assembly prior to shrinking will be found to bend quite easily when finished but is best

set near to shape while still warm. The final installation is shown in **photo 12**.

There should be some footsteps on top of the buffer stocks. These could be made from sheet steel and bonded in place with epoxy. They're something I didn't bother with.

A final item worth considering is an access bung directly below the hand pump clack valves. A bit of 5/16" brass hexagon bar with a very short 1/4" x 40TPI thread would do. This allows a prodger to be used to lift the bottom valve ball if it should ever stick (as they sometimes do). These parts are shown in **fig 6**.

To be continued

Rare WW2 German Tank Destroyer to Make Guest Appearance at Tiger Day

Nicknamed the Nashorn 'Phoenix' after restoration was delayed by a devastating fire, a WW2 German tank destroyer will be running at Tiger Day Autumn in September 2026. The Nashorn came from the Netherlands to make its UK debut at Tankfest in June and will be staying at The Tank Museum until 2027.

Named from the German for Rhinoceros, it will be appearing alongside Tiger 131 in a display of Second World War tanks at Tiger Day, 26 September.

Based on the Panzer IV and Panzer III chassis, it is thought that this vehicle had been the victim of an aircraft ground attack due to the damage found on the parts.

A team of engineers established the Nashorn Restoration Project in 2015 to bring the vehicle back to life, but faced disaster when a fire burnt down the workshop in 2019 causing extreme damage to the vehicle.

With donations from tank fans and wider help from the international community of military vehicle restorers, museums, and historians,



the Nashorn has risen again. It is one of only three Nashorns left in the world. "This vehicle is completely unique – not only as the only running Nashorn, but for the incredible story of its restoration," says Elliot Wills, Events Operations Manager. "We are excited to be able to show it alongside the world's

only operational Tiger I and many other one-of-a-kind WWII tanks at Tiger Day." Tiger Day also includes a mock battle to recreate Tiger 131's capture, living history, specialist talks, and more. It is a sell-out event; booking in advance is recommended. Visit tankmuseum.org/tiger-day

The San Diego Model Railroad Museum Receives Historic Collection

In June representatives for the San Diego Model Railroad Museum (SDMRM) journeyed north to the San Jose area to receive an important model railroading collection many decades in the making.

The collection was owned by narrow gauge modelling pioneer Robert 'Bob' Brown, who passed away peacefully on February 1st. Bob was an award-winning modeler who focused on the preservation of narrow-gauge modelling and founded Finelines magazine in 1964 and later launched the Narrow Gauge & Short Line Gazette in 1975. Bob also contributed heavily to the NMRA's Magic of Scale Model Railroading exhibit at the California State Railroad Museum in Sacramento. The transfer of Bob's

collection was managed by his long-time friend and well-known model railroader Charlie Getz.

The collection is one of the best examples of early narrow-gauge modelling, with emphasis on the 1930s to 1950s when modelling of the gauge was in its infancy and modelers had to scratch-build everything. Bob's collection of narrow gauge items includes detailed structures related to his freelanced On3 Tuolumne Forks, a tribute to the narrow gauge logging and mining lines of the western United States, as well as handmade and scratch built rolling stock, including those created from wood and brass, made by Bob as well as other early narrow gauge model railroading pioneers such as Edmund Collins III,

Jack Alexander, Carroll Weiss, Whit Towers, Bill Coffey, E.L. Moore, Mark Schweraferger, and Chuck Trombley. Objects from the Bob Brown collection will be placed on display at the San Diego Model Railroad Museum in the coming months.



The 2025 NAME Junior Award Scheme Winner

The Northern Association of Model Engineers runs an award scheme each year for Young and Junior engineers in various age groups. Chairman, Denis Mulford, has recently been on his travels presenting the awards to two youngsters with one left to do. Both received a trophy, certificate of merit and a cash sum.

The Junior Engineers Award winner for 8 to 10 years for 2025, went to Nicholas Gary Ragan. Nicholas is an active member of the Leicester Society of Model Engineers with a young active brain who will go far. **Photograph 1** is by TJ Ragan and was taken at the Leicester track. The winner of the junior award for 14

- 17 years of age for 2025, is Illiam Pendlebury from the Oswestry and North Shropshire Model engineering Society. Illiam is a very capable young man who will be starting an apprenticeship in engineering on leaving school. **Photograph 2** is by Sue Mulford and was taken at the Oswestry track.



The Bradford Cup and Stevenson Trophy 2026

We have only received a small number of entries for both of these two model engineering competitions, decided by a poll of readers of *Model Engineer & Workshop* and members of our forum, www.model-engineer.co.uk. We have decided to extend the deadline for entries to the **26 August** to make sure we have a good contest.

The Stevenson Trophy

The Stevenson Trophy is presented for a well-made and usable piece of tooling, a modification to a machine or an accessory for a tool where the fact

it works well is more important than making it look good.

The competition is open to all *Model Engineer & Workshop* readers and Model Engineer forum members, who may enter their own work. We encourage entries of items published in MEW, but unpublished items can be entered. To enter, send no more than four good photographs of your entry with up to 500 words of description by email to neil.wyatt@kelsey.co.uk.

The Bradford Cup

The Bradford Cup is awarded to the author of the best article or series in

Model Engineer & Workshop during the previous year. Articles that appeared in Issue 4762, March 2025 to 4773, February 2026, are eligible for this year's competition.

Entry to the Bradford Cup is by nomination by a third party only, you cannot nominate yourself. To make a nomination, please send the name of the author and the article in question to neil.wyatt@kelsey.co.uk.

Full rules for both competitions appeared in ME&W Issue 4778.

Win Free Tickets to MMEX 2026

It's one of the must-visit events of the modelling calendar, and this year you could be there thanks to our brilliant competition.

**MIDLANDS
MODEL
ENGINEERING
EXHIBITION**



**THURSDAY 15th to SUNDAY 18th
OCTOBER 2026**

WARWICKSHIRE EVENT CENTRE

www.midlandsmodelengineering.co.uk



We have five pairs of tickets to this year's Midlands Model Engineering Exhibition, courtesy of Meridienne Exhibitions, and they must be won by our readers... so get your name in the hat!

The exhibition will take place from October 15 to 18 at the Warwickshire Event Centre, Leamington Spa.

At the heart of the show, as ever, are the models themselves. You can enjoy hundreds of exhibits across 32 competition and display classes, showcasing exceptional craftsmanship and a wide range of engineering disciplines. More than 30 clubs and societies will also be there, presenting their own displays and providing opportunities to connect with fellow enthusiasts.

The exhibition will feature nearly 40 leading specialist trade suppliers,

offering everything model engineers need - from tools, machinery and materials to components and expert advice.

A programme of live demonstrations, workshops and talks will offer you further opportunities to learn and develop new skills.

Opening hours are Thursday to Saturday: 10am to 4.30pm, and on Sunday from 10am to 4pm. The venue offers free parking, restaurant and coffee shop facilities, and a shuttle bus from Leamington Spa Railway Station on the Thursday (charges apply).

Full details of the event are at www.midlandsmodelengineering.co.uk where you can also purchase advance tickets.

To enter, simply answer the following question:

How many competition and display classes are there at the exhibition?

- a) 64
- b) 32

Then either scan the QR code or visit

<https://www.model-engineer.co.uk/859472/win-tickets-mmex-2026/>

TERMS & CONDITIONS

N.B. For this competition we can only accept entries from those residing in the UK. The closing date for receipt of entry forms will be 17 September 2026. No cash alternatives to the prizes are available. Terms and conditions apply see www.kelsey.co.uk/terms-conditions. To view the privacy policy of Kelsey Media Ltd (publisher of ME&W) please visit www.kelsey.co.uk/privacy-notice.



01526 328772

STATION ROAD STEAM

LOCOMOTIVE BUILDERS • BOILERMAKERS

Engines of all sizes bought & sold

Good prices paid up front - no waiting, no commission!

For full details, high resolution pictures and video go to our website

www.stationroadsteam.com

Visitors welcome by appointment

**Unit 16-17 Moorlands Trading Estate,
Metheringham, Lincs LN4 3HX**

info@stationroadsteam.com

01526 328772

**CRAFTMASTER
PAINTS**

01954 231308

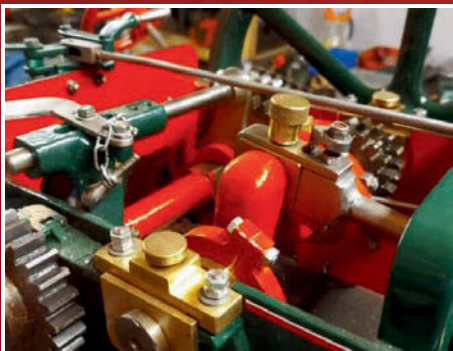
www.craftmasterpaints.co.uk

info@craftmasterpaints.co.uk

The UK's Leading Heritage Paint Supplier

We provide traditional brushing Coach Enamels for a wide range of applications including Steam Engines, Locomotives and Classic Cars. Alongside this we provide Engine Enamel for Stationary Engines and Machinery in original colours.

Please visit our website for further information or get in touch for a free Standard Colour Range colour chart



Club Diary

Please send your events for Club Diary to meweditor@mortons.co.uk

2026

EVERY SUNDAY

Urmston & District MES

Public Running every Sunday
Contact: secretary@udmes.co.uk

Warrington MES

Running day. Contact :
contact@wdmes.org.uk

Wakefield SMEE.

Public running day. Contact
Denis Halstead 01924
457690

AUGUST

23 Stafford Model Engineering Society

Running day at County Showground, Stafford. 10:00-14:00. Further information via www.sdmes.co.uk.

27 Guildford Model Engineering Society

Public running days at Stoke Park Railway. Info and times see www.gmes.org.uk.

30 Saint Albans Model Engineering Society

Running sessions at Puffing Field. 1pm start, weather dependent.

30, 31 Bristol SMEE

Public Running day, Ashton.

31 Brighton & Hove SM&LE

Hove Park Railway public open day. www.hovepark.com

SEPTEMBER

5 Bromsgrove SME

Bromsgrove SME will be hosting the Rob Roy Rally plus other 3.5" friends all welcome. Contact Doug Collins 07585 524836.

6, 13 Stafford Model Engineering Society

Running day at County Showground, Stafford. 10:00-14:00. Further information via www.sdmes.co.uk.

12, 26 Brighton & Hove SM&LE

Hove Park Railway public open day. www.hovepark.com

13 Bradford Model Engineering Society

Public running day. Members from 11:30 am, public from 1:30 pm to 16:00, whatever the weather, Northcliff. Contact: Russ Coppin, 07815 048999.

13 Chichester Model Engineers

Public running at Blackberry Lane, Chichester PO19 7FS. 13:00.

13, 20 Bristol SMEE

Public Running day, Ashton.

13 Saint Albans Model Engineering Society

Running sessions at Puffing Field. 1pm start, weather dependent.

20 Guildford Model Engineering Society

Public running days at Stoke Park Railway. Info and times see www.gmes.org.uk.

26-27 St Albans and District Model Engineering Society

The BIG St Albans Model Show.

OCTOBER

3 (TBC) Bradford Model Engineering Society

Visitors Day. BMES welcomes members and their locomotives from other societies to Northcliff for breakfast & lunchtime butties. Let Russell know in advance, please: Russ Coppin, 07815 048999.

10, 24 Brighton & Hove SM&LE

Hove Park Railway public open day. www.hovepark.com

11 Chichester Model Engineers

Public running at Blackberry Lane, Chichester PO19 7FS. 13:00.

11 Bradford Model Engineering Society

Public running day. Members from 11:30 am, public from 1:30 pm to 16:00, whatever the weather, Northcliff. Contact: Russ Coppin, 07815 048999.

14, 18, 25 Bristol SMEE

Public Running day, Ashton.

17 Gauge 1 Yorkshire Group

Running day at Drax Power Station social club, 9:30 to 15:30. Bar open for drinks, breakfasts and lunch. All welcome.

18 Stafford Model Engineering Society

Running day at County Showground, Stafford. 10:00-14:00. Further information via www.sdmes.co.uk.

18, 29 Guildford Model Engineering Society

Public running days at Stoke Park Railway. Info and times see www.gmes.org.uk.

18, 31 Saint Albans Model Engineering Society

Running sessions at Puffing Field. 1pm start, weather dependent.

NOVEMBER

14 Gauge 1 Yorkshire Group

Bonfire Night Bash at Drax Power Station social club.

14 Stafford Model Engineering Society

Running day at County Showground, Stafford. 10:00-14:00. (Weather permitting, check Facebook page). Further information via www.sdmes.co.uk.

DECEMBER

5 Gauge 1 Yorkshire Group

Christmas Bash at Drax Power Station social club, 9:30 to 15:30. Bar open for drinks, breakfasts and lunch. All welcome.

5, 6 Bristol SMEE

Santa Specials, Ashton.

6 Guildford Model Engineering Society

Public running days at Stoke Park Railway. Info and times see www.gmes.org.uk.

14 Chichester Model Engineers

Christmas public running at Blackberry Lane, Chichester PO19 7FS. 13:00.

29 Stafford Model Engineering Society

Running day at County Showground, Stafford. 10:00-14:00. Further information via www.sdmes.co.uk.

2027

JANUARY

16 Gauge 1 Yorkshire Group

Running day at Drax Power Station social club, 9:30 to 15:30. Bar open for drinks, breakfasts and lunch. All welcome.

FEBRUARY

20 Gauge 1 Yorkshire Group

Running day at Drax Power Station social club, 9:30 to 15:30. Bar open for drinks, breakfasts and lunch. All welcome.

MARCH

20 Gauge 1 Yorkshire Group

Running day at Drax Power Station social club, 9:30 to 15:30. Bar open for drinks, breakfasts and lunch. All welcome.

An Air Powered Hand Engraver

It's surgery time! **Mitch Barnes** starts modifying the compressor for his low-cost air engraver, developed during the lockdown of 2020.



To make the compressor drive air pulses back and forth instead of a constant one-way stream along the airline, some modifications need to be made to the piston to stop it pushing air in one direction, for which it has holes in its periphery and flap valves behind. Basically, we'd be losing the flap valve completely and plugging the piston holes.

The first task is to remove the combined handle and branch of the cylinder head where the hose and pressure gauge had been attached because we won't be needing these. Going to no expense in manufacture, the ribbed black plastic cover/handle that sits over this branch is held on with a single tiny self-tapper. Removing this screw reveals that the cylinder head and the branch are cast in one piece with the cylinder head. Luckily for us it's made of the finest quality Dinky toy metal that the makers could procure. It succumbed quickly to the superior forces of a British made *Eclipse Junior Hacksaw blade*, **photo 12**. Onto the next stage then.

Ah yes, the cylinder head. It's held on with four screws, one in each corner. I'd need some kind of screwdriver for this so let's see what type of screw they are. Capheads? Button heads? Grubscrews? Surely not self-tappers? Er...no. These are new horizons in Engineering, Folks! Two-inch countersunk head wood screws! At least there was one in each corner!

Stunned by such a level of quality, I undid them with ease because they'd hardly engaged at all and filed them in my random woodscrews box. The pointy end of



Photo 12: This snap shows the bits I took off.



Photo 13: To keep this finely crafted compressor from possibly blowing its own head off, here's a snap of the wood screw holes being retapped M4 for proper bolts that will actually hold the cylinder head in place. The black disc with six holes is the piston.



Photo 14: With the head removed and holes tapped, I popped the cylinder back on for this shot, but the end plate has now been removed, revealing the crankshaft end and conrod.

each screw just about bit into holes moulded in the plastic body of the compressor. I wondered whether (a) this compressor really does pump out 120psi and (b) if it did, how many microseconds it would last before the cylinder head blew off? I decided not to find out. At the very least, I'd be making it far more secure.

The cylinder itself is a short length of honed tube and is a push fit onto both the cylinder head and the compressor body. I popped it off to get to the screw holes for some improvements. The first of these would be to replace the woodscrews with high tensile M4 button head screws. You may ask why I chose button heads. This is because their heads are slightly larger in diameter than cap heads, giving theoretically at least, a bit more area for the cylinder assembly to be held on with. We are dealing with plastic for the compressor body. Luckily there was enough material there to enable the holes to be tapped M4, **photo 13**. To be extra safe on reassembly, I wanted to make sure it was as strong as possible so I decided to put nuts on the underside too, because if this thing really did pump out 120psi, M4 threads would strip out pretty quickly too, so the nuts would more than likely take the pressure.

The next job was to look at the cylinder and the piston/crank arrangement; there'd be a bit more surgery here too. I removed four more weeny self-tappers to release the end plate, to check the thickness

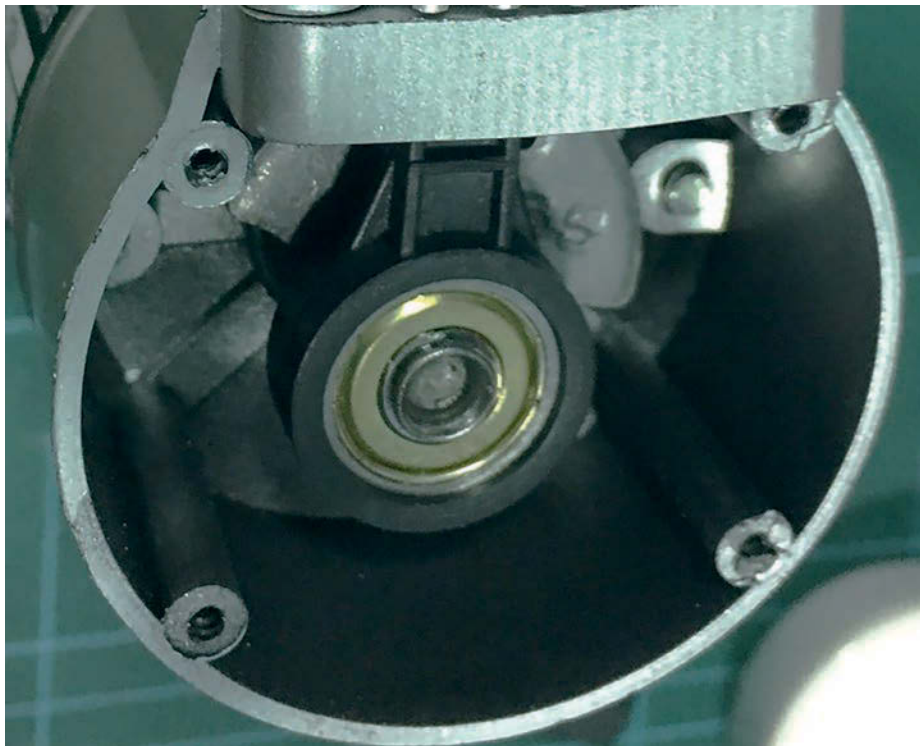


Photo 15: Removing the endplate revealed that the piston and conrod are in one piece!

of the material I was going to put replacement cylinder head securing screws into, **photo 14**.

Taking off the end plate revealed the piston, which to enable minimal investment for the manufacturers, is moulded in one piece with the conrod, **photo 15**, with no articulated joint between the two! At least my compressor has a ball bearing on its drive shaft: Simon's didn't, even if the piston and conrod are in one unjointed piece! Thus describing an oval locus as it moves, the piston relies on a flexible rubber edge seal to take up the difference in gap between itself and the (circular) cylinder wall, with lots of grease for lubrication. I hoped that the plastic casing of this compressor will be able to withstand whatever pressure it actually produces. The length of fake extruded aluminium 'cylinder fins' was decoratively superfluous and no help here, only being kept more or less in its rattly place by those woodscrews and it didn't even contact the cylinder. I popped it into my spares box, which is a sort of waiting room for those things destined ultimately for the Great Waste Bin in the Sky.

The piston had six holes on a PCD moulded through it, **photo 16**, which needed filling up if this compressor was to pump air back and forth. Why would the piston have holes in it? This was to suck air into the cylinder: the other side of the piston had a thin membrane attached which acted as a flap valve. In order to pump the

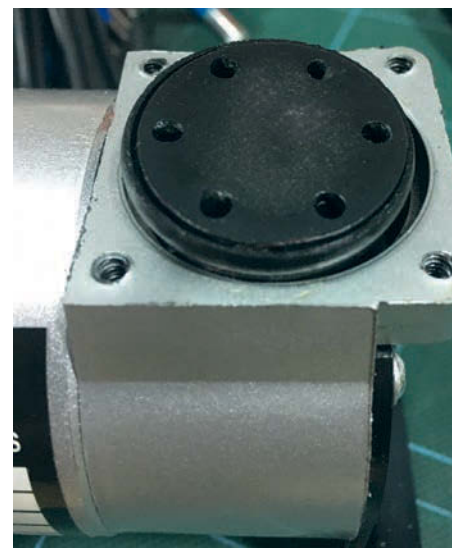


Photo 16: Here's a snap of the piston, with the cylinder removed again. Those 6 holes in the Delrin piston need filling up too.

same air back and forth along the flexible hose to the handpiece, we need to plug these six holes and lose the flap valve. The contoured O-ring around the piston's periphery, acting as a piston ring was clever but not what I needed – see later. Delrin is an inert plastic so gluing these holes up would be a waste of time. I tapped them out and put an M4 x 4 grubscrew into each one, held in with friction, (by opening out the hole undersize to tap for an M4 grubscrew, making it an incredibly tight fit), and hope, in



Photo 17: This is the top surface of the Cylinder head, die cast in Mazak alloy.

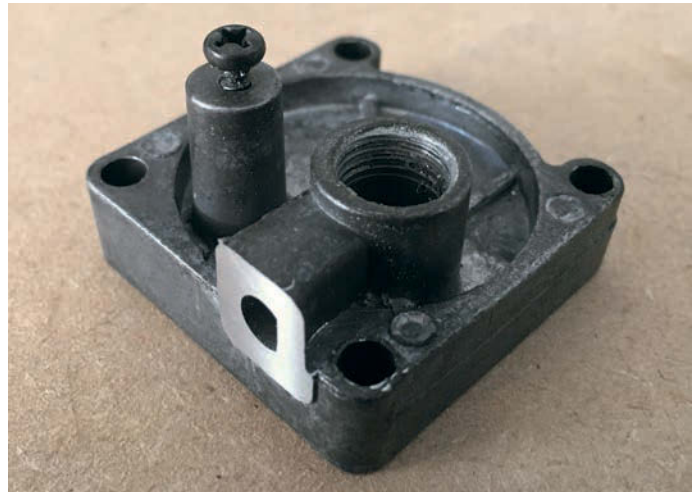


Photo 18: That looks better! There's a little more to do though...



Photo 19: About to take the plunge to create a circular section 5mm diameter hole to tap M6.



Photo 20: And here's the tapping operation under way.



Photo 21: Milling off the handle locating lug was easy because this mazak die casting was not resistant at all.



Photo 22: Evidently the manufacturers were so confident in the use of this compressor that they warn you of it becoming a volcano...

the form of some superglue anyway, slogged in as blobs to stop the screws turning. I have no idea how long this arrangement will last but so far it has.

The tube which acts as the cylinder wall is almost the only precisely made part of the whole compressor: a nicely honed but very short length of steel tube. I smeared some graphite grease in there for lubrication. Finally I replaced

the contoured piston ring with a normal nitrile one from a box of O-rings I'd bought a few months before, because intuition told me at the time (correctly as always) that in the near future I'd need it, even though on principle I'll never use one on a steam engine. And because when testing before any surgery was carried out, (without the hose or anything else attached to the head, giving a free flow of air) the original seal had shredded itself within 30 seconds. Quality? What's quality?

ONTO THE CYLINDER HEAD.

Having hacked the air hose/pressure gauge branch off it, I needed to close off any means of escape for air, other than the airline I'd be installing elsewhere.

Photograph 17 is a snap of the cylinder head after I'd sawn off the hose and valve branch as mentioned earlier. On the right hand side of the head at about 1 o'clock is the stump where the hose and valve branch was sawn off; at about

12 o'clock is a non-return valve held in place by a 1/8" BSP grub screw held in with nasty brown and ineffective thread lock of doubtful parentage and (not unlike brittle toffee in appearance) and that grub screw plus its valve bits are shown spread out on the right. At about 4 o'clock on the head is a tapering cylindrical lug whose crosspoint screw secured the now-removed ribbed black plastic covering. My plan was to use the convenient 1/8" BSP thread to take an airline attachment and close off the stump of the branch. The 4 o'clock lug might get in the way later so its days were numbered too.

That D shaped hole, **photo 18**, is basically 5mm diameter with a flat on it. Using a 5mm milling cutter, I converted the D-shaped airway you can see here into a round one suitable for tapping M6 for a grubscrew to close it off, **photo 19**. Using a drill on a hole shaped like that would have had the drill bit wandering aimlessly all over the shop and across the road to the bus stop. The resulting 5mm hole is perfectly sized for M6 and a short M6 grub screw was ready and waiting with some proper thread lock which isn't brown and useless like the toffee stuff that had held the air outlet valve in place.

Having drilled the hole to a circular section with the 5mm end mill, I kept the positions unchanged and then happily tapped the resulting hole M6, **photo 20.**

Once that was done, I flipped the cylinder head to horizontal and milled off the lug which had supported the plastic cover and drilled out the 1/8" BSP threaded opening for tapping deeper for a bit more hold. Using a 1/8BSP plug tap, I tapped it a few more turns further down, to clear the toffee thread-locking gunk residue from the thread and to allow enough turns of the thread to comfortably accommodate my airline fittings. Lastly, I milled off the locating lug that had supported the handle, **photo 21**. That Dinky Toy metal was lovely to machine.

Next, reassembly. As mentioned previously, I used M4 x 35 stainless steel button-head machine screws to replace the original woodscrews, with nuts underneath the casing. This is probably academic as there's a limit to how much pressure a 2mm thick polypropylene moulding can take, but it made me feel a bit better anyway.

With that surgery done, it's time for a change. This time it's personal, err, electrical. And here's a warning label to prove it, **Photograph 22**. It's either a threat to that famous Vulcan character Dr Spock or it'll turn into an erupting volcano if it gets hot. So there! You have been warned!

All that needs to be done electrically was to cut off its ciggy lighter lead to a length of about a foot or so: the remaining bit can be trimmed to suit later on but this temporary operation gets it out of the way. This is a twin wire figure of eight cable and the wire with the ridge on it is the positive.

Luckily for me, Simon had come up with a wiring diagram, **fig 2**. This showed that the bits he'd told me about, and that I'd bought in already now needed to be nailed together. These included the power supply mains plug connector – a mains kettle type 'Euro lead and socket (with fuse and on/off switch) and a speed controller. Neither one required any surgery. **Photograph 23** shows the power supply and **photo 24** is the speed controller.

Luckily for me an on/off switch and rheostat were already attached, reducing the chances of a major cockup on the electrical front with me failing miserably to solder either one in the right place without shorting it all out. Its readout shows an arbitrary number that bears no relation to the rpm of the compressor, but it's really handy when you set the engraver up to perform a specific job because one can be consistent with the air setting at least. I considered its £8.75 purchase price well worth it just for that.

I also wanted to attach the air hose to the cylinder head and decided that I'd buy in a selection of appropriate airbrush fittings for all the airline attachments. These are all 1/16 BSP and easily obtainable all over the world. They seemed to be anyway



Photo 23: Apparently, this should do the trick on the power front; Power Supply 12V 25A.



Photo 24: Well worth the price for the convenience of having a digital readout, this is the speed controller with an on/off switch and a rheostat already attached.

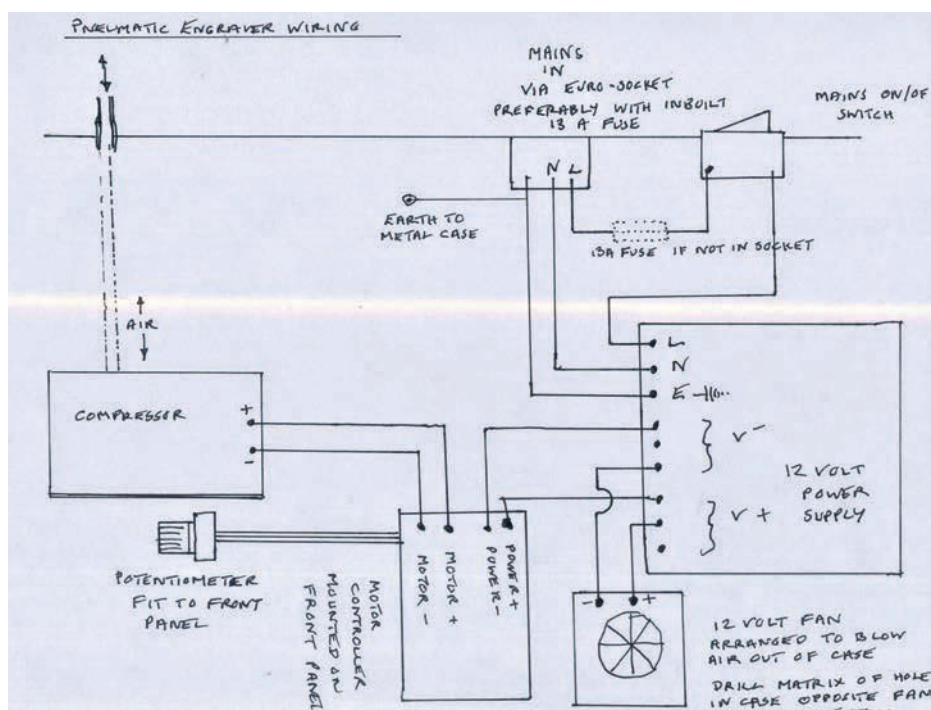


Figure 2: Simon's wiring diagram.

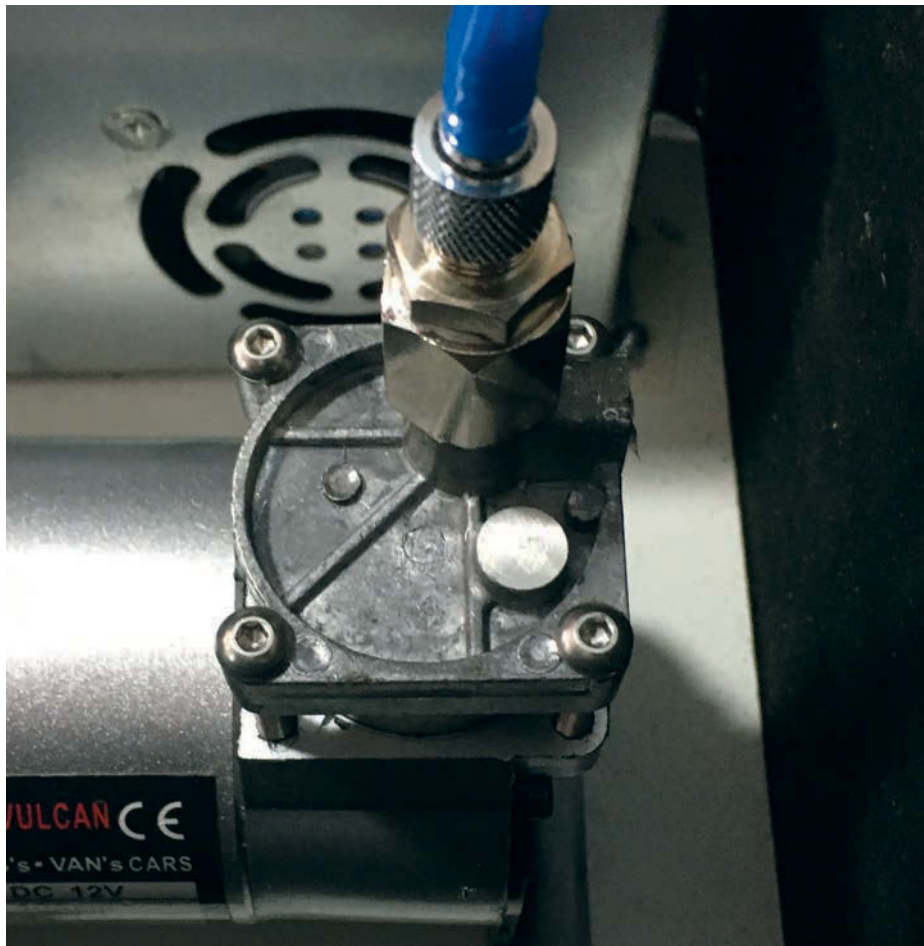


Photo 25: This is the cylinder head back on the compressor with its airline attachment.

because I found adverts for them all over the internet. With funds tight, because Lockdown had caused me to be stuck at home unable to go to work, I bought them from whoever offered the lowest price, because they were all identical! Having chosen the consistent fittings route, a 1/8BSP male with a 1/16 BSP outlet was easy to find, even with a quick release, so I needn't have the handpiece permanently attached. I used PTFE tape wherever it was required to keep all the airline joints airtight.

There was a variety of prices available. The bits seemed to be identical as if they all came from one factory – they probably did – or they were superbly pirated copies, but I found but I could pay a certain price for a particular fitting from one supplier and pay five times as much for the same thing from another! All of them were 1/16th BSP which seems to be an international standard, so everything works together. You'd think that American ones would have slightly different but similar-looking threads like the milling machine clamping kits which, wherever I work, are either 3/8 Whitworth or M10 but somehow are always mixed up...

At the top right of **photo 25** you can see the air hose coming from the top of the now modified cylinder head, comfortably fitted into the 1/8 BSP hole I'd re-tapped. The alternative arrangement shown in **photo 26** has a quick release and adjustable valve.

This nifty little quick release valve was also bought online, being a pretty standard airbrush fitting that is widely available. The adjustment knob on its side is another device to help us adjust the speed or air volume of the handpiece.

Having got this far and with my workbench a mess, I also needed something to put the setup in, to keep it all together and keep my little workshop tidy! Simon's original setup had been enclosed within a small red steel toolbox that was no longer made - a pest because it had a useful carrying handle. Scouring the internet produced quite a few candidates from steel bread bins to old suitcases, but the thing I went for in the end was this, **photo 27**, which started life as a vanity case and cost about £20. These boxes also have an advantageous tendency to muffle sound which makes the setup more neighbourhood-friendly than a steel box. Boy that compressor, like all



Photo 26: The Air Line fittings are all standard Airbrush components.



Photo 27: This vanity case had a superfluous mirror and shelves within but was externally a smart candidate on the appearance front.

car emergency type compressors I have ever come across, is NOISY!

Resembling a small flight case, this looked to me to be a good candidate as they are usually sturdy and I know how they are made, having altered a few in my time. The handle was a big boon too. They usually have a textured alloy skin backed with plywood and the framing holds it all together. This one was similar except that instead of aluminium it was the finest quality spray-painted styrene sheet backed with 2mm MDF. There was a little shelf system included that I removed but getting the mirror out seemed as if it would compromise the strength of the lid, so I left it in place.

To Be Continued

Aviation Classics

Monthly



The legendary aircraft of WWII to the Cold War, brought to life. Aviation Classics Monthly delivers expert features, rare archive photos and stunning commissioned art – plus a 6-page gatefold poster cover in every 88-page issue.

Subscribe today!

shop.kelsey.co.uk/aviation-classics-monthly



ALIBRE ATOM3D

Powerful and affordable 3D Design software for miniaturists



Pay Once, Own It Forever

No subscription nonsense – own your tools and use them offline.



3D Printing/CNC

Export your design in STL, STEP, SAT, DWG, or DXF for whatever your 3D printer or CNC software needs.



Easy to Learn

A simplified yet powerful toolset doesn't bombard you with options – get up and running fast.

Get your free trial at www.mintronics.co.uk

0844 3570378 business@mintronics.co.uk

HOME AND WORKSHOP MACHINERY



Lorch LAS lathe £4250



Boxford 280 lathe 5 1/2" x 20" Metric leadscrew & dials £2950



Super 7 lathe very nice example! £3450

144 Maidstone Road, Fooks Cray, Sidcup, Kent, DA14 5HS
Tel: 020 8300 9070 - evenings 01959 532199
website: www.homeandworkshop.co.uk
email: sales@homeandworkshop.co.uk
visit our eBay store! almost 9000 items available; link on website;
homeandworkshopmachinery



Colchester Bantam 2000 lathe (long bed) metric leadscrew, Dickson post £3250



Emco Super 11 head £1450



Myford ML 10 Lathe 3 jaw chuck + external jaws Cabinet stand £1400



Harrison M300 £3500



Harrison L5 M250 M300 Colchester Student 1200 / 1800 + A&S 1ES gears



JET GH1440 lathe from art college in very good order complete £3450 NICE!



Myford Super 7B Connoisseur centre lathe + Tesla inverter, DRO, stand, tooling £9750 Stunning!



CP DP MOD gear cutters in stock!

Please phone 0208 300 9070 to check availability.
Distance no problem – Pallets leaving daily! – prices exclusive of VAT
Just a small selection of our current stock photographed!

Worldwide
Shipping





Photo 13: The collection of work from members of the Exeter & District MES.

The South West Miniature Engineering Show

John Arrowsmith concludes his report from this big new model engineering show..

Exeter & District MES had an eclectic mix of models and equipment on their display, **photo 13**, with some fine locomotives, stationary engines and workshop equipment. The Worden Tool Grinder looked to be a very useful piece of kit. **The Federation of Model Engineering Societies** brought their informative stand with plenty of information regarding boiler tests and insurances, together with details for younger people and their parents to get involved in any form of model engineering, **photo 14**. Another informative display was by the **7 1/4" Gauge Society** which showed off what the Society had to offer with a short length of track and a nice vertical boilered locomotive and a couple of slate wagons, together

with photos and information. **The Society of Model and Experimental Model Engineers(SMEE)** provided an excellent mix of models and equipment from their extensive collection to demonstrate what the Society has to offer, **photo 15**. The display included some examples of smaller inexpensive models that are available for beginners and younger people together with information about the materials used in their construction.

Another society with a good mix of models on their display was the **Plymouth Miniature Steam Club** who were proud to show off what their Young Engineers had completed. For example two 12-year-olds have completely refurbished two derelict Mamod Steam Rollers. They have

made many of the parts required, **photo 16**. They are to be congratulated on achieving such a high standard at such a young age. It shows what young people can achieve when they are given the right instructions and care. The general presentation by the Plymouth members was excellent with a wide variety of quality models on show. There was a nice mix of locomotives and rolling stock by the members from the **East Somerset SMEE**. **The Bath & West Railway** with a model of a rail mounted Steam Crane, **photo 17**. I could not determine whether it was based on a prototype or a freelance model, but nevertheless it caught the eye. There was also a nostalgic look by the local **Meccano Society** who provided some unusual models



Photo 14: An informative display by the Federation of Model Engineers Societies.

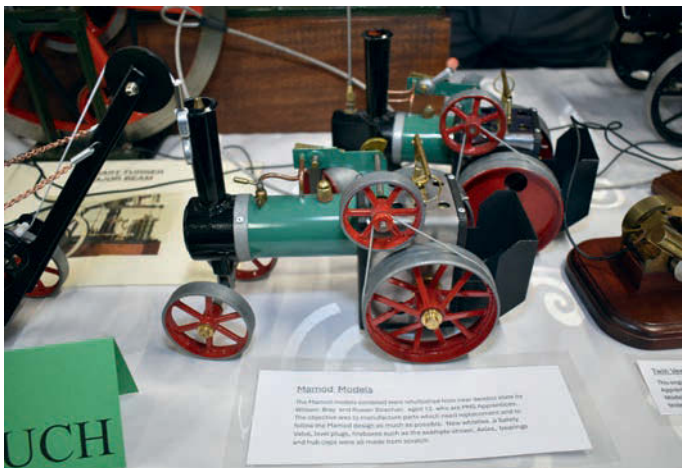


Photo 16: A pair of Mamod Steam Rollers completely refurbished by two young engineers from Plymouth.



Photo 18: The traditional appearance of good Meccano models.

in this vintage modelling medium, **photo 18**. A display by members of the **Torbay Wood Turners** included a couple of jewellers working in metal to their stand, added to the overall range of exhibits on show, **photo 19**.

Outside on the concourse was a selection of larger models both static and in steam. Operating a

good length of 7 1/4" gauge track were members of the newly formed **Torbay Light Railway** and this was their first public outing, providing the opportunity for two large steam locos to be in steam and giving rides to visitors who wanted to experience this gauge of railway. **Idris, photo 20**, built by the late Gary Cooper and



Photo 15: The neatly laid out and presented display by members of SMEE.



Photo 17: A steam powered Railway Crane from the East Somerset Society.



Photo 19: The Torbay Wood Turners display.

fellow member Kelvin Stapleton, is based on a Thomas II design and was operating very well and the other loco, *Kilgharrah*, is based on Countess from the Welshpool Railway. At times they were topping and tailing the carriages and at other times on their own, both going well. A couple of very good 3" scale traction engines were



Photo 20: Idris a 7 ¼" Hunslet prepares to reverse back to the station.



Photo 22: 21ft steam launch *Zara Finn* in the care of the Steam Boat Association of Great Britain.



Photo 21: Davinder Matharu with his 6" Savage Traction Engine "Anjali".



Photo 23: The excellent Garden Railway layout with members of the South Devon Garden Railway Group.



Photo 24: The Cotswold Oil Engine Preservation Society were operating this Lister D Type Petrol Engine and pump.

busy demonstrating their abilities, both positively sparking in the bright sunshine. A 3" Allchin based on Royal Chester was being driven by Alex Stackhouse who was very enthusiastic about the show and the opportunity to encourage younger people into the hobby. The other 3" scale Engine was based on a Fowler A7 and built by Bob Evenit over a 16 year period and is now owned by a member of the Yeovil club. Davinder Matharu from Bristol was

thoroughly enjoying himself with his 6" scale Savage *Little Samson* Traction Engine, **photo 21**. He insisted I join him for a ride round and it was a most enjoyable experience. Alongside these Mike Ford was driving his Steam Traction World Foden steam lorry which was performing very well.

A full size exhibit outside was presented by the **Steam Boat Association of Great Britain** in the shape of a 21ft *Frolic* steam launch,

Zara Finn. Powered by a Stuart 6A and Kindon boiler, the boat was built in 1990 and is in excellent condition, **photo 22**. It will be performing at the Bristol Steam Boat festival in July. In contrast to this full size exhibit the **South Devon Garden Railway Group** were demonstrating their attractive layout to show what can be achieved in this popular railway scale, **photo 23**. The **Cotswold Oil Engine and Preservation Society** had a 1939 Lister D Type Petrol Engine merrily pumping all day to demonstrate the old way of doing things, **photo 24**.

Well that just about sums up the **South West Miniature Engineering Show** which I found to be a first-class event. Like everything in life there will always be something that does not please everyone, but being a first in this part of the country it has certainly awakened the need for exhibitions like this. Rob Speare and his colleagues are to be congratulated on the organisation and variety of displays. They all did a splendid job of which they should be very proud. Let's all hope that this show can be repeated again next year. I understand that the venue has already been reserved for the 14-15 May 2027 at the racecourse, which is an excellent location with plenty of free parking and easy to find. Thank you everyone for an excellent weekend. ●



Club News

Geoff Theasby reports on the latest news from Model Engineering Clubs.



Photo 1: LBSC(?) designed loco.

Power Mosfets are a new kind of semiconductor enabling very high currents to be switched with ease and low loss.. As an example, a common power fet can pass about 50 amps at 50 volts. A previous industry standard power transistor, the 2N3055, can only handle about 40 volts and less than 15 amps. These transistor's circuits are not very efficient, and become hot in use, meaning that a heat sink is necessary. The Mosfets are lower loss, so do not need so large a sink. More on this subject in the future, if space permits. In this issue, *Steam Whistle*, May, from **Sheffield & District Society of Model and Experimental Engineers** reports not one, but issues on the national railway network. At close-by Dore and Totley station, in 2024, an operation had to be delayed as some calculations brought doubt on the crane's ability to lift a new bridge into position. Much was the shouting thereof. And then,

from the June issue, earlier this year another bridge was destined to be installed when it was found out that the Network Rail engineering train was missing a vital wagon, which had been left in Norwich and there was no time to get it. More contumely! Editor Mick Savage considers the immense benefits of having discovered fire, and its uses, from cooking food, through the copper, bronze and iron ages, and to boiling water, and therefore making steam. We know what happened then, don't we children? Mick Savage has unearthed a video from 2008 clearly showing the improvements made to the site since then. www.sheffieldmodelengineers.com. In **St Albans & District Model and Experimental Engineers** July newsletter, Chairman, Mike Collins expresses relief as the club has weathered a number of crises during his tenure. Thankfully that the situations have been resolved and life is returning to normal. An

electric toothbrush, left in the sun, had the light accidentally focussed on it, and as it traversed the sky, burned a track of melted plastic as a record of its visit. A coach trip to the Black Country Museum was enjoyed by all, and the variety of exhibits kept people reminiscing. Mike has initiated a project involving the Arduino microcontroller, he suggests that this will be a good introduction into what it can do. www.stalbansmee.com. In **East Somerset Society of Experimental Engineers**, July/August, Chairman George reported on the events of the year. No derailments, or loss of a loco to disrupt and no messing, let it all hang out! In June a speed race was held. Rules went by the board, and no messing about with limits, give it all you've got! Winner, Roy L won with 9.72 mph. Much humour and good nurtured ribbing followed, and many and various were the reasons aired as to why a locomotive did not go faster. Notably, there was



Photo 2: RC Trains Warrior at Bakewell

no loss of temper. Editor, Michael, built a Toylander, with the help and advice from Stuart Bond, who had made several. The ESSMEE Quiz No 2 is launched. Answers by email only. Caleb Etherington has created a section of the newsletter called Junior Spread and publishes newsletter for Junior Members. A selection of pictures taken by some of the JMs was included and I must say I thought the one from Jett Taylor, with a backlit steam locomotive exhaust, taken at the the Bitton rally, was very notable. www.essmee.org.uk. From the **Bristol SMEE**, comes *The Bristol Model Engineer*, with new editors Andy and Nicola, who have made a good start, and they are hopeful for the future. Thomas Hunt writes on the Aerotrains, and its demise. Bernard North has prepared a series of articles on materials. This time the subject is brass. Bob, having moved several times in his career, has written up how he built a new workshop in his current house. 'Dr Evil' lists 10 rules for locomotive construction, such as marking up axleboxes with the wrong details and in the wrong order, this will give a challenge to the subsequent owner, and test

their anger management abilities. www.bristolmodelengineer.co.uk. **Steam Chest**, from the **National 2 1/2 inch gauge Association**, lists the most recently joined members, and Cedric Norman suggests twenty minutes watching a video on the building of a locomotive, called, '6207, a study in steel!' Referring to his time spent as an apprentice, he explains how Go/No-Go gauges helped him and his fellows to make products accurately. Australian member, Warwick Allison makes a *Fayette* using a new boiler design. Cedric covered drilling the steam passages in his *Ayesha 2*. Two officers of the Association have been granted life membership, Robert for his management of the membership records and Cedric for a ten year and ongoing editorship of the Association's newsletter. Some 3-D printed ideas emanate from the pen of Michael Williams. Perhaps he could print himself a hat with '3-D Printer' on it. www.n25ga.org. **SFMR Newsheet** from The **Stockholes Farm Miniature Railway** calls upon members to arrive *en masse* in order to make the site presentable for their Open Day, which will have happened

by the time this article appears in print. Ivan and Barbara travelled on the Great Britain XVIII and were most impressed. The tour took 8 days and visited destinations from Aberdeen to Penzance. They also took part in the Great Central Railway bash, and also boasted that King George VI cooked their breakfasts. The 'King' cooked their breakfasts one morning but was not so grand as one may think. The cook was also a part-owner of the hotel, and part-time actor, who dresses up as King George for these events. I watched a very good video on YouTube concerning how and why contra-rotating propellers were used on aircraft, and to a lesser extent, boats. As the subject was new to me, to avoid possibly getting it all wrong, if I wrote it up myself, and got it all wrong, which doesn't normally stop me, I refer readers to search for the video. The concept was patented by the great engineer Frederick Lanchester in 1907. It was called upon in our country's hour of need when the Griffon engined Spitfire was killing its pilots by unpredictable and violent torque reaction. In the contra-prop system there is negligible torque reaction and there is a thrust increase too. *The Gauge 3 Newsletter*, Summer, from the **Gauge 3 Association**, Chairman Cliff Barker praised the British Motor Museum at Gaydon, the venue for their the AGM, which offered three times the space used previously. Trevor Goodman displayed a GW loco, probably of 'LBSC' provenance, but we have no more information on it, **photo 1**. I suspected 'LBSC' was involved, as the proportions are all wrong. Don Crouch lets us in on the subject of weathering railway vehicles, in a six-page article. www.Gauge3.org.uk. The above was closely followed



Photo 3: Voith diesel converted by Michael Beets.



Photo 4: United Steel No 22 at SSMEE.



Photo 5: Fairlie Elsi at Sheffield.

through my letter box by the *G1 Newsletter and Journal of the Gauge 1 Model Railway Association*. Editor, Rod Clarke, is keeping the *G1 N&J* going in the absence of a new incumbent. It features a shunting horse on the front cover, as a change from the usual 'mechanical horse' variety, and I will neignsay anyone that claims otherwise. The Association was looking forward to Gauge 1 North in Bakewell, (twinned with Nuneaton) on Saturday, 11 July. Michael Beets converts a Voith DCC diesel to radio control, **photo 2**. John Boyson writes part 1 of an introduction to Class 27 locomotives, and Simon Duhamel rebuilds an SNCF 2D2-9100. Bruce Fleet scratchbuilds a U-1951 Pullman car set, from 1951(!), and Geoff Hallam upgrades an Aster, 'Schools' locomotive. Following an appreciation of New Zealander, Geoff Hallam, which asks why so many NZ members are published in the *N&J*? In the numbers, since 2019, seven of their members have had 48 items published out of 733 printed articles. This is from 0.55% of the membership! Editor Rod thinks it is because of the amount of material published by NZ members to the *NZ Group Journal*. He says that the journal is the only English language publication of its range, quality and consistency he knows of in the whole of the *G1MRA*. www.g1mra.com. We went to Bakewell for *Gauge 1 North*, where we enjoyed the sight of the large layout 'Ridings', Deborah was most impressed by this busy operation. These 3-D printed vehicles and track were worthy of closer inspection. This 0-6-0 RC trains *Warrior* was at Bakewell, **photo 3**. A good starting set from this company could set young people off in the railway field. This is United Steel No 22 at the

Sheffield Open Day, **photo 4**. Also that day, the late Tim Goddard's remaining tools were available for sale, I was very taken with a locomotive kit on offer at £95 (Retail price £750). When I returned for another look, with the devil squatting on my shoulder, it had gone. "Thank heavens for that", says Deborah! The Open Day led me to a video on the YouTube channel *Tweety's travels* featuring a canary yellow Austin 7 (Tweety - I tort I taw a puddy tat...) This Fairlie, 'Elsi' built in North Wales, made an arresting presence as its side tanks make it look larger, **photo 5**. www.sheffieldmodelengineers.com. I do my electronics/radio from the basement. I was weary and ill at ease, unable to make a successful project recently. I'd rebuilt it, got it running,

then tidied it up and checked the joints quality, and the correctly coloured wires. I then attached the case. Now look! A completed project in its box and working! This is unprecedented, I declare a red letter day! That sign on my wall which says "Calm down and bin it", is never more true than when I get to grips with a new bit of electronics. We visited Buxton for Railex, **photo 6**, and both Deborah and I were very impressed by *Purgatory Peak*, a 3-D diorama of a multi-level quarry with trains popping in and out of holes in the cliff face and activity going on going on all over, **photo 7**. It reminded me of Whack-A-Mole. And finally, I'm getting rid of my vacuum cleaner. After all, it's only collecting dust. 🐼

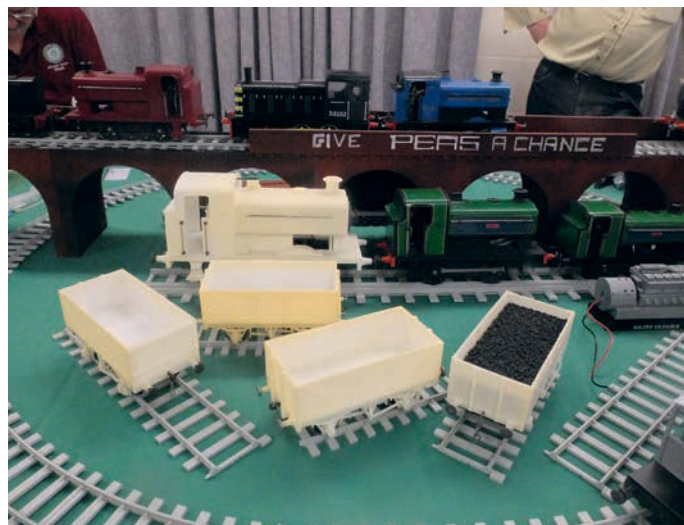


Photo 6: 3-D printed locomotive and rolling stock at Bakewell.



Photo 7: 3-D Purgatory Peak, at Buxton.

FREE Private adverts

You can now place your classified ads by email. Don't waste time scanning the form, just send the text of your ad, maximum 35 words, meweditor@mortons.co.uk, together with your full name and address, a telephone number, whether it's a for sale or wanted and stating that you accept the terms and conditions for placing classified ads – see below. Please note, we do not publish full addresses or website links to protect your and other readers' security.



TOOLS AND MACHINERY

Myford spares for sale. ML7 Lever feed tail stock adaptor, Lathe raising blocks & bolts, 2x7.5 inch face plates (grey). 4.5inch catch plate & driver. ML7 change gear guard back plate, ML7 gear quadrant & bracket, 2 gear clusters & set of gears (11). For more details please ring. **Tel. 01484 656196. Huddersfield, West Yorkshire.**

¾ hp English electric single phase 2 speed motor, £60 buyer collects. Brook Compton 3HP single phase motor, £60 buyer collects, vari speed hydraulic drive unit f/r ¾ hp rated, £60 buyer collects. **Tel. 07951 974318. Burnley.**

Various tools etc. for sale due to merging of two workshops including: Pillar drill, bandsaw, various power hand tools, heavy duty finisher, vices, wheeled workshop table, heavy duty wheeled machine stand suitable for a CNC mill, various hand tools, 1-phase electric motors, lots more. Collection only, so all very cheap – would rather they found good homes. **Email stub.mandrel@gmail.com for a full price list. Barry.**

Myford indexable tool post and fixed tool post. Collect from SO18 or can post £20. Moore & Wright thread gauge - excellent condition. £10. Postage £4.30



Email: ashurst.prop@live.co.uk. Southampton SO18. Nylon gear lock for changing chuck on the ML7. £5. p/packing £3.20. Tel: . SO18. Email: ashurst.prop@live.co.uk. Southampton. Winfield lathe £250 ono. PVE pitter gauge tool, good condition with case £60. Email: **kath75james75@gmail.com. J24 M1.**

I have for sale a Colchester bantam 1600 with 3 & 4 jaw chuck, steady rest all gears converted to single phase. I don't believe the high gears work but after reading on forum it may be me that needs to check again. **Email: andrewmark110675@gmail.com. Hull.** Tom Senior dividing head tailstock. I have a spare Tom Senior tailstock for sale with a 2.75inch centre height. It appears to have had very little use. As with all Tom Senior accessories it's a quality item. Can post at cost. £40. **Tel: 07754 799803. Email: mwheily10@hotmail.co.uk. Norwich.**

MODELS

Part Built 7 1/4" gauge Milner Hunslet, comes with nearly finished tender, brass sheets for saddle tank and AJB Engineering built steel boiler with full certs. Most of the castings have been machined with some

work outstanding. Please contact for more details £6000.

Tel: 07918643480. Email: mylesjones@hotmail.co.uk. Chirk near Wrexham.

5" Gauge Diesel Electric Shunter 4QD speed controller. Ground Level riding truck, Raised Level riding truck, Loco Carriage box, Two 12v batteries, sale due to ill health. Cash only, Collection only £2,250 ovno. **Tel: 07961232552. Email: mike.white7001@gmail.com. Ruskington.**



MAGAZINES, BOOKS AND PLANS

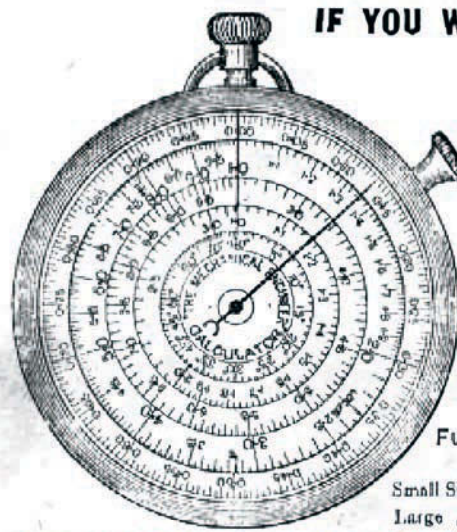
Sentinel, Thomas Green, Tram and Oversteam Road Wagon books. Hardback with dust covers. Near new condition with minimal signs of use. Buy individually or the lot. Collection preferred. £5. Postage & Packing from £5.15. **Email: mewalker1764@gmail.com. Downham Market.** Railway Mechanical Engineering. A Practical Treatise By Engineering Experts (1923)

– 2 volumes. Hardback Books. Cover of Vol 1 is original red colour, whilst Vol 2 cover is faded. Inside pages intact and in good condition. P & P available. £10 set £10. **Email: mewalker1764@gmail.com. Downham Market.**

WANTED

Wanted Engineering in Miniature mag September 2020. Engineering in miniature mag March 2021. To complete collection. **Tel. 07828120085. Shipley, West Yorkshire.**

TIME IS MONEY, IF YOU WANT TO SAVE 50%



USE THE MECHANICAL ENGINEER POCKET CALCULATOR.

It will Calculate Anything.

FULL PARTICULARS POST FREE.

Small Size, 7/9; Abroad, 9/-
Large, 12/9; „ 15/-

SCIENTIFIC PUBLISHING CO., 63, NEW BAILEY ST., MANCHESTER.

For more classified ads visit www.model-engineer.co.uk/classifieds. You will need to be a member of the forum and logged on, but this is a FREE service for readers. Some forum ads may be used on this page if space allows.

MODEL MAKING METALS

1/32in. to 12in. dia. bright steel, stainless steel, bronze, spring steel, brass, aluminium, silver steel, steel tubes, bolts, nuts & screws, tap dies + drills, white metal casting alloys.

Fine materials, chain, plastic.

Lathe milling machines and equipment, new and secondhand.

Mail order nationwide and worldwide callers Mon.-Fri. 9 - 5pm. *All cards welcome.*

Send now for a FREE catalogue or phone

**Milton Keynes Metals, Dept. ME,
Ridge Hill Farm, Little Horwood Road, Nash,
Milton Keynes MK17 0EH.**

Tel: (01296) 713631 Fax: (01296) 713032

www.mkmetals.co.uk

email: sales@mkmetals.co.uk

J A Alcock & Son Courses



**Craft Your Own
Mechanical Clock
Movement**

**Introduction
to Practical
Clock Servicing**

3 East Workshops, Harley Foundation Studios,
Welbeck, Worksop, S80 3LW
(Workshop visits by appointment only)

For more information including additional courses run by J A Alcock & Son please see our website

Tel: 01909 488 866 Web: www.sortyourclock.co.uk

All courses taught by a Fellow of the British Horological Institute

 Find us on 
@sortyourclock



**THE
HARLEY
FOUNDATION**



MAXITRAK

MODELS • ENGINEERING SUPPLIES

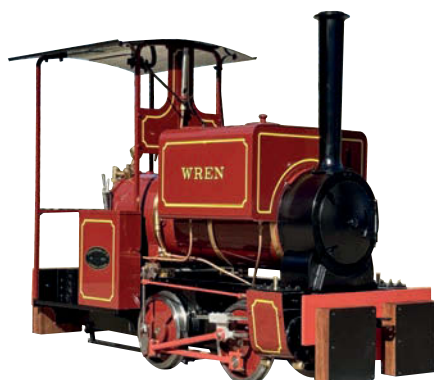
Nearly 50 years
of model making excellence



Accucraft UK 16mm & Gauge 1



3/4" DG6 Sentinel Lorry



New Maxitrak Wren
5" Gauge Coal Fired
Live steam!

Kit or ready to run



5" & 7 1/4" Gauge
Kits and ready to run models



5" Planet in stock now



UK stock • In-house warranty support • Nearly 50 years of engineering
T. 01580 893030 E. info@maxitrak.com

Visit our showroom in Kent. 10-11 Larkstore Park, Lodge Road, Staplehurst, Kent. TN12 0QY. UK.
Open Mon - Fri 9am to 5pm. No appointment necessary.



Est. 1978

MODEL ENGINEER & WORKSHOP

EST. 1898

THE LEADING MAGAZINE FOR HOBBY ENGINEERS AND MODEL MAKERS

To advertise please contact Fiona Leak

Email: fiona.leak@kelsey.co.uk

Tel: 01507 529573

ALL LIVE STEAM ENGINES WANTED

ANY SIZE & CONDITION INCLUDING PART BUILTS



Stationary Engines inc. Stuart Turner, Bing etc
Traction Engines and Locos in all sizes.
Especially wanted 4" and 4½" gauge Traction Engines.
Any Locos from gauge 1 to 7¼".
Also any Electric models locos, buses etc
Will collect personally. Distance no object.



Call Kevin on 01507 606772 or 07717 753200

M-MACHINE

Unit 6 Forge Way, Cleveland Trading Estate
Darlington, Co. Durham. DL1 2PJ

Metals for Model Makers

Contact us for Copper, Brass, Aluminium,
Steel, Phosphor Bronze, etc.

PHONE 01325 381300

e-mail: sales@m-machine.co.uk
www.m-machine-metals.co.uk

MODEL ENGINEER & WORKSHOP

Complete home Workshops Purchased

Essex/Nottinghamshire locations

Distance no object!

Tel: **Mike Bidwell**

01245 222743

m: 07801 343850

bidwells1@btconnect.com

ALWAYS IN STOCK:

Huge range of
miniature fixings,
inc Metric, UNC,
UNF, BSW, BSF & BA

ModelFixings.co.uk

also the home of **ModelBearings.co.uk**

• Taps, Dies & Drills • Adhesives • Materials
• Engine & Miniature bearings • Circlips, etc. etc.

Tel/Fax: +44 (0)115 854 8791 Email: info@modelfixings.com

www.model-engineer.co.uk

classic magazines

**Celebrate what you love with
a magazine subscription**

WHAT IS BEST OF BRITISH?

Best of British is the UK's premier nostalgia magazine,
covering every aspect of life from the 1930s to today.



Message from the Editor...

Packed with features
that celebrate classic
entertainment,
transport, food and
drink, and more, not
to mention Postbag
and the Yesterday
Remembered memoir
section, a subscription
to *Best of British* is
always going to be
great value.

Simon Stabler

sarik hobbies

The World's Biggest Selection*

Huge range of engineering,
railway & locomotive plans



www.sarikhobbies.com

* World's biggest selection of printed RC Model Plans & Short Kits.

MODEL ENGINEER BUILDER

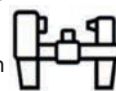
O, OO & HO Gauge
Scenery, Boats
& Buildings

webuyanypworkshop.com

Re-homing model engineers' workshops since 2018



It's never easy selling a workshop that has been
carefully established over a lifetime.
I will buy your workshop so you don't have
to worry about finding a new home for much
loved workshop equipment & tools.



Please email photos to
andrew@webuyanypworkshop.com

Alternatively WhatsApp photos to **07918 145419**

Or to discuss selling your workshop,
please call Andrew on **07918 145419**

All equipment considered: Myford, Warco, Chester, classic British brands, etc

VISIT: classicmagazines.co.uk

CALL: 01507 529529

Your favourite magazines delivered direct to your door.

Free Post & Packaging.

Huge savings across our whole range on 12 & 6 month subscriptions.

5" GAUGE WAGON KITS

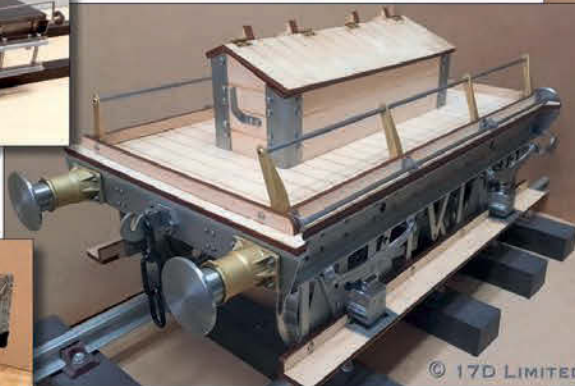
Email: sales@17d.uk
Phone: 01629 825070



BR/LNER Brake Van
5 Plank Wagon

Kits start from around £470

See our website or call
for full details



GWR Shunters Truck



Banana Box Van
7 Plank Wagon



WHEELS

Visit www.17d-ltd.co.uk
for latest prices & stock



*8 Spoke Wagon
Wheels*
4 wheels / 2 axles
in 5" & 7¼" gauge



Machined Axle Boxes & Bearings
in 5" & 7¼" gauge



*Bogie Kits in 5"
& 7¼" gauge*



*Plain Disc
Wheels*
*in 5" &
7¼" gauge*



5" gauge 3 Hole Disc Wheels
with profiled face



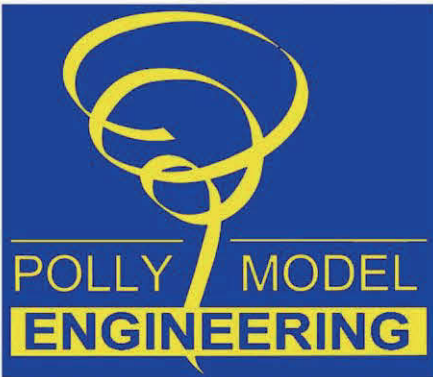
Narrow Gauge Wheels
in 5" & 7¼" gauge



www.17d-ltd.co.uk

MINIATURE RAILWAY SPECIALISTS
LOCOMOTIVES, ROLLING STOCK, COMPONENTS
CNC MACHINING SERVICES

17D Limited, Units 12 & 13 Via Gellia Mill, Bonsall, Matlock, Derbyshire, DE4 2AJ



POLLY MODEL ENGINEERING

*For all your Model
Engineering Requirements*



Extensive range of parts:
pressure gauges, injectors,
steam valves, superheaters,
lubricators, oil cans,
transfers, spanners,
taps and dies, draincocks
nuts and bolts etc.

Stationary Engines and Locos

- Orders welcome via
Website

Telephone or Email!



Polly Model Engineering
Unit 203 Via Gellia Mills,
Bonsall, Derbyshire,
DE4 2AJ, United Kingdom

www.polly-me.co.uk

Tel: +44 (0)115 9736700

Find us on 

sales@polly-me.co.uk