MAKE A HANDLE FOR MOVING HEAVY CHUCKS

MODEL ENGINEER & WORKSHOP

EST. 1898

THE LEADING MAGAZINE FOR HOBBY ENGINEERS AND MODEL MAKERS

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Volume: 235, Issue: 4773, February 2026

A Pultra Collet Chuck for Myford Lathes

MAKE ROD JENKIN'S ADAPTOR FOR 10MM COLLETS

Introducing Alibre Atom3D

A FREE SIX MONTH TRIAL OF THE POPULAR CAD SOFTWARE

Club Stands at MMEX 2025

JOHN ARROWSMITH REPORTS ON SOME IMPRESSIVE MODELS

INSIDE this packed issue:

TAP HOLDERS FOR LATHE AND MILLING MACHINE · WATER FEED SYSTEM FOR THE PANNIER TANK ENGINE · A TOOL FOR ACCURATE DUMMY RIVETS · VISITING THE NEW JERSEY LIVE STEAMERS RUNNING THE CORLISS MILL ENGINE · A SOLAR TRAM · MACHINING A SUPERHEATER HEADER SPINDLE AND WEAR ADJUSTMENTS FOR MACHINES · FULL REPORT: LOWMEX 2025 BATTERIES IN THE WORKSHOP · LB&SCR TERRIER · PLUS ALL YOUR REGULAR FAVOURITES!

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FEBRUARY 2026

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SMOKE RINGS

HAPPY NEW YEAR

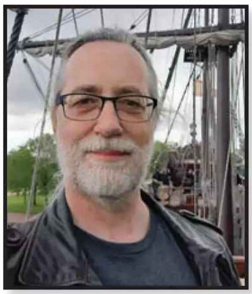
May I wish every reader all the best for the New Year. I hope the coming year brings you peace, health and prosperity, as well as much enjoyable and productive time in your workshop.

I see some positive signs for the hobby – one green shoot is that the number of enquiries I receive from beginners seems to be rising. Hopefully many of them will find their way to the forum or their local model engineering society, and benefit from the experience, wisdom and encouragement that their members can offer.

Another positive sign is that a new show will be launched this year in the South West. Alongside MMEX, LowMex and the St Albans exhibition, let's hope they all continue to succeed and attract and inspire new model engineers. One thing the shows are demonstrating is the ever-widening scope of our hobby – which should always be as broad as full-size engineering. They also demonstrate that there are youngsters getting involved, through various different initiatives.

ALIBRE ATOM 3D FREE TRIAL

I pleased to announce that we've been able to repeat an offer that we ran in Model Engineers' Workshop back in 2019. This is a free trial licence of Alibre Atom 3D for six months, full details are in Robert Footit's article in this issue. I know choice of a CAD system is a very personal thing, but I have been using Atom 3D for several years now and find it easy and fast to use – although I keep learning new things about it!



Neil Wyatt
Editor

NEW EMAIL ADDRESSES

My apologies to anyone confused by the email addresses given in Smoke Rings last month. I found the error when proofing but somehow the correction didn't get done and I didn't pick this up. The correct emails are: Editor - **neil.wyatt@kelsey.co.u**k and customer service **subscriptions@kelsey.co.uk.**

Neil

CJ18A Mini Lathe - 7x14 Machine with DRO & 4" Chuck

SPECIFICATION:
Distance between centers: 350mm
Taper of spindle bore: MT3
Spindle bore: 20mm
Spindle speed: 50-2500mm
Weight: 43Kg

Price: £585

AMABL210D BRUSHLESS MOTOR 8x16- LARGE 38mm spindle bore

SPECIFICATION:
Distance between centers: 400mm
Taper of spindle bore: MT5
Spindle bore: 38mm
Number of spindle speeds: Variable
Range of spindle speeds: 50~2500rpm
Weight: 65Kg

Price: £1,185

AMABL250E-550 - VARIABLE SPEED LATHE - 38mm SPINDLE BORE & ELECTRONIC CHANGE GEAR SYSTEM (ELS)

SPECIFICATION:
Distance between centers: 550mm
Taper of spindle bore: MT5
Spindle bore: 38mm
Number of spindle speeds: Variable
Range of spindle speeds: 50~2500rpm
Weight: 140Kg

Price: £1,925

VM25H R8 with Belt Drive & Brushless Motor - HIGH SPEED - 100-4000 rpm

SPECIFICATION:
Model No: AMAVM25H (R8)
Max. face milling capacity: 63mm
Table size: 700×180mm
Range of spindle speeds 100-4000 rpm
T-slot size: 12mm
Weight: 120Kg

Price: £1,488
W DRO – Price: £1,921
W DRO + Z & X PF - Price: £2,382

XJ12-300 with BELT DRIVE and BRUSH-LESS MOTOR

SPECIFICATION:

Gas Strut
Forward Reverse Function
750W BRUSHLESS Motor
Working table size: 460mm x 112mm
Gross Weight is 80Kg

Price: £725

VM18H High Speed - Milling Machine R8 with 3 Axis DRO

SPECIFICATION:
Model No: VM18 R8
Max. face milling capacity: 50mm
Range of spindle speeds 100-4000 rpm
Table size: 500×140mm
T-slot size: 10mm
Weight: 80Kg

W 3 AXIS DRO - Price: £1,692

For more detailed information about these machines, please visit our website. If you have any questions or need further assistance, feel free to contact us.

WWW.AMADEAL.CO.UK

MPV290F-Movable Mill Head Lathe &Mill & Drill Combination Machine with STAND

SPECIFICATION:
Distance between centers: 750mm
Taper of spindle bore: MT5
Taper of tailstock quill: MT3
Motor: 1.5kw
Weight: 280Kg

Price: £5,225

VM28H - High Speed - Ball Screw Type Milling Machines - R8

SPECIFICATION:
Model No: **VM28H** - R8
Max. face milling capacity: 63mm
Table size: 700×180mm
Range of spindle speeds 100-4000 rpm
T-slot size: 12mm
Weight: 120Kg

Price: £1,608
W DRO – Price: £2,142
W DRO + Z & X PF - Price: £2,734

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Contents

See pages 32-33 for details!

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Extra Content!

There's lots of extra content to be found online to support past articles in Model Engineer & Workshop. Find out more at: www.model-engineer.co.uk/forums

Visit the www.model-engineer.co.uk forum for extra content for this issue including:

3d printable patterns for the Corliss Engine.

Hot topics on the forum include:

Recommendations for first lathe started by **danielw** - One of the oldest questions in the hobby… Which is better a second-hand classic machine or a new import?

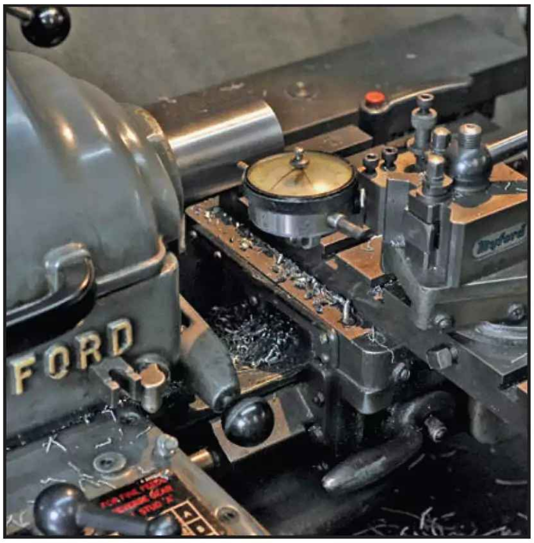
Imperial counterbores? Started by **Andrew Tinsley** - Where to source them and ways to make your own.

EMCO 150mm Rotary table with Stepper motor indexing started by **Joseph Noci** - An interesting approach with plenty of detail if you want to try it yourself.

Is there still a place for a shaper in a modern workshop?

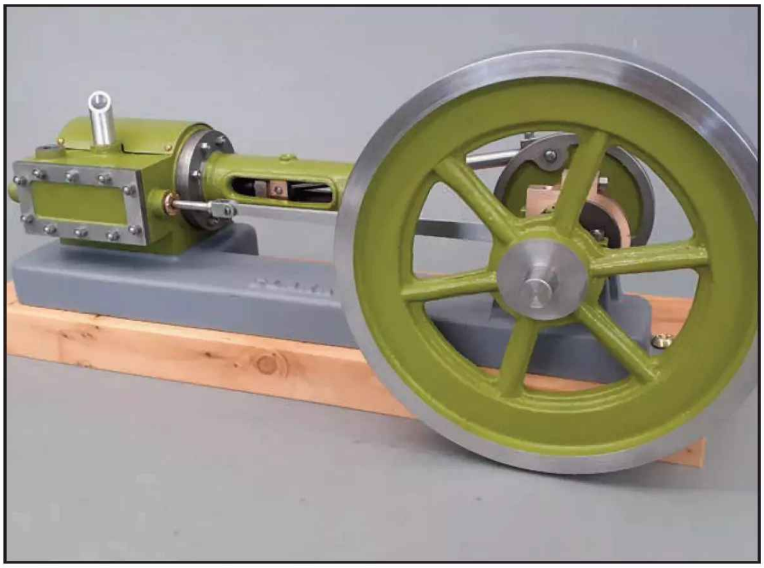
Come and have a Chat! As well as plenty of engineering and hobby related discussion, we are happy for forum members to use it to share advice and support. Come and join us – it's free to all readers!

On the Cover



Our cover features Rod Jenkin's lovely Myford, working on his Pultra collet chuck. Read more about the building of this useful accessory from page 15 of this issue.

Next Issue



In our next issue, Jason Ballamy starts work on a delightful model Clarkson Horizontal Engine, from Blackgates' castings and suitable for beginners in the hobby.

alibre ATOM3D

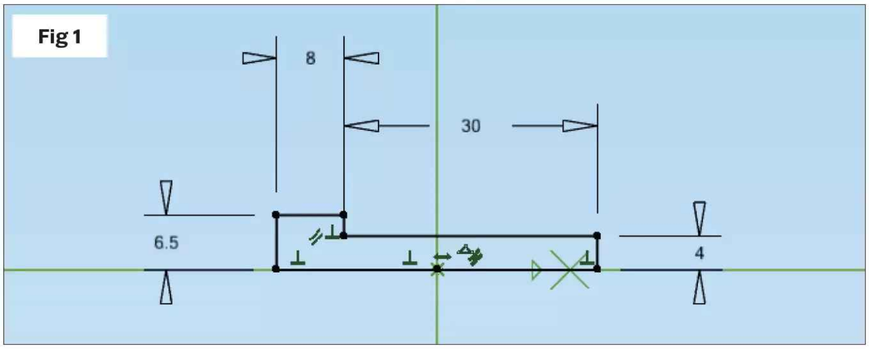
Introducing Alibre Design

Robert Footitt explains the basics of this popular 3D design package. Using the code at the end of this article you can download a free six-month trial of Alibre Atom 3D to try it for yourself.

Alibre design is a parametric CAD system aimed at mechanical design. Parametric CAD refers to a type of 3D modelling where models are defined as a set of features recorded in a tree structure. At any stage you can go back and edit these features to make changes to the design. Parts created in this way can be combined together in an assembly workspace, which works by recording a tree of constraints that describe how the parts are positioned in relation to each other (for example a pin can be centred into a hole using a coaxial constraint). 3D part or assembly models can be exported directly into standard 3D formats such as STEP (typically used to transfer data to other 3D Design or CAM systems) or STL (the standard file format for 3D printing), or they can be used to drive 2D drawings in the drawing workspace. In the Drawing workspace, the software creates the views based on the 3D model, and these can then be annotated with additional information required for manufacturing.

This type of modelling requires a bit more up-front work than a direct modelling application or 2D CAD system, however the big advantage is that the feature tree and linked drawings allow for rapid iteration once the model is setup. It is possible for example, to edit the length of a linkage within an assembly and see the impact on the position of all the other parts immediately after than change is made.

Fig 1



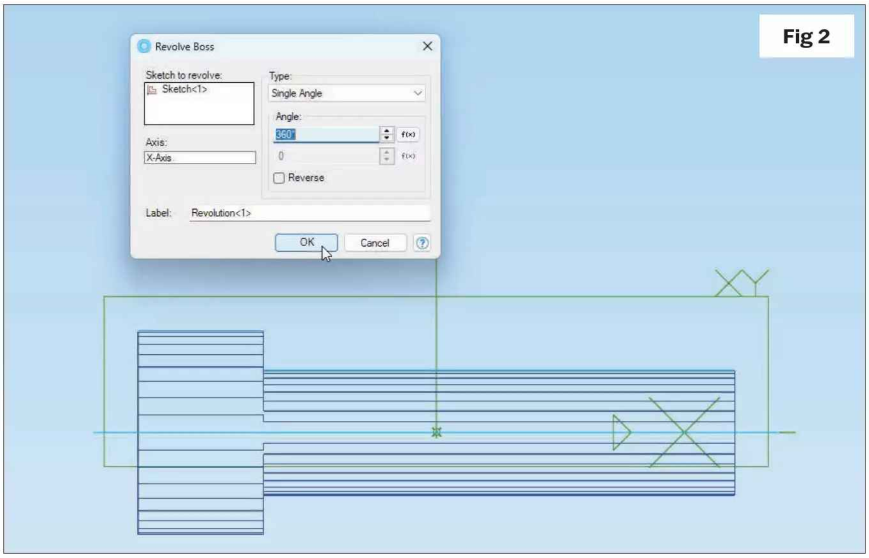


Fig 2

WHY ALIBRE DESIGN?

Alibre Design has been the primary 3D CAD system used at RF3 Design since 2009. It's a robust tool, and aside from being very cost effective, the stand out features of Alibre are:

- It's quick, Alibre is very focused with a strong core set of tools that can be used to tackle most tasks. It avoids the bloat that some other systems have, where tools are duplicated between multiple toolsets aimed at different niches.
- Alibre has excellent multi monitor support, allowing multiple linked windows to be opened at once allowing the user to edit a part on one screen whilst viewing the impact of the changes in an assembly on another.
- Alibre has excellent import and export capabilities making it easy to work with existing data from other CAD systems or to export data into specific formats required by manufacturers.

There are three tiers in the Alibre family:

- Alibre Atom 3D – Aimed at hobbyists, this version has all the basic modelling, assembly and drafting tools needed

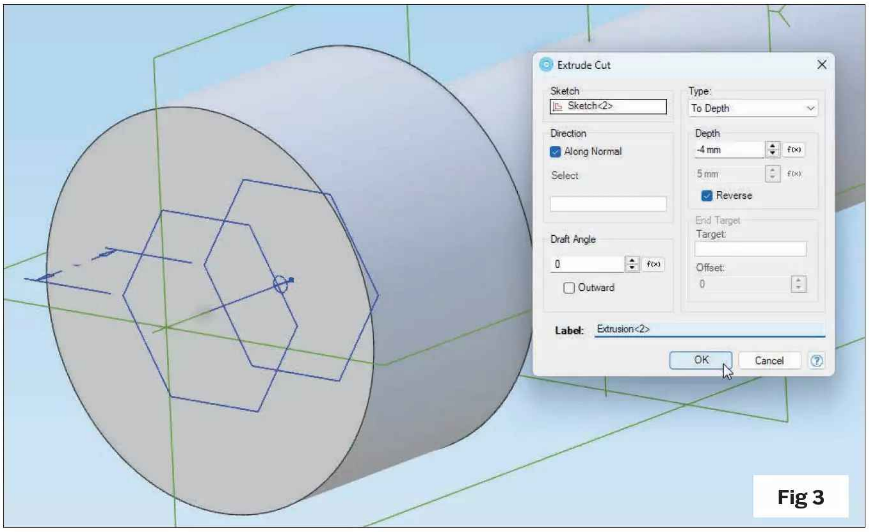


Fig 3

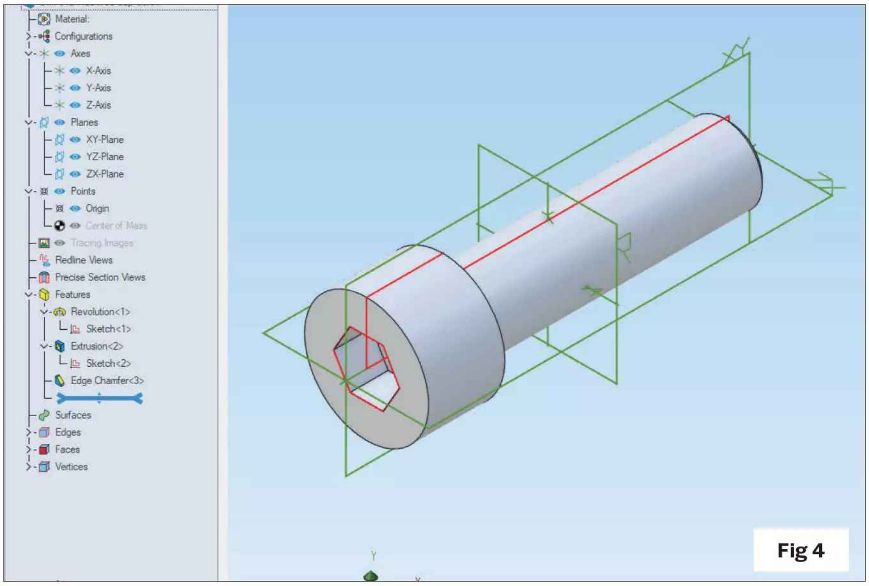
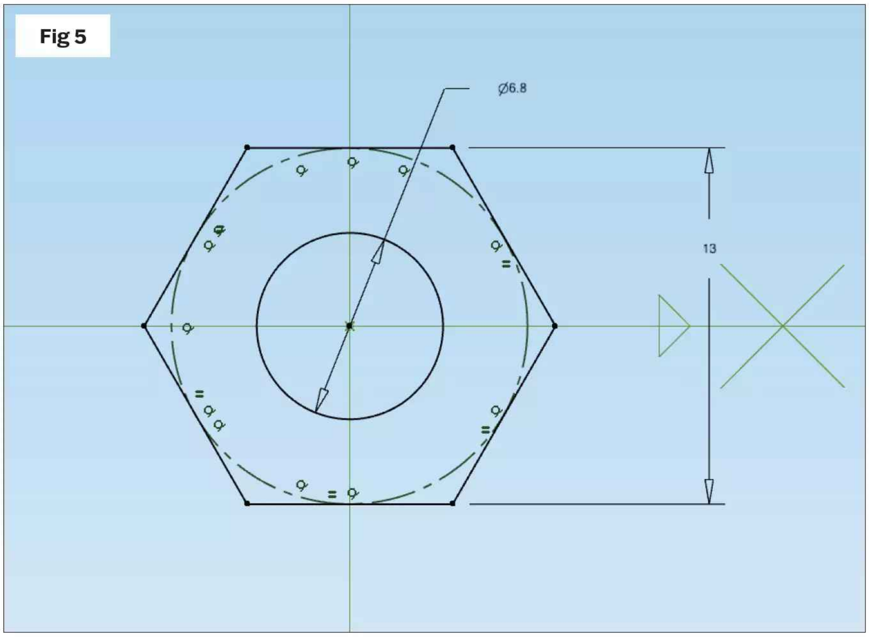


Fig 4

Fig 5



to create designs suitable for CNC machines, flatbed routing tables and 3D printers.

- Albre Design Professional – This version adds additional tools such as draft, boolean, Bill Of Materials and such needed for industry design projects like injection moulded parts design or tooling.
- Alibre Design Expert – The top tier of Alibre, this adds a sheet metal toolset for fabrication design, a suite of tools to help manage large projects and KeyShot for photorealistic rendering.

This article will focus on the tools available in Alibre Atom 3D. Despite lacking some of the more advanced features mentioned above Atom 3D is a very capable design package.

The following is a simple example that demonstrates the main capabilities of Alibre Atom 3D: An assembly model comprising of two parts, an M8 x 30mm Socket Cap Screw and M8 Hex Nut, with a linked 2D drawing.

If you would like to follow along, a link is provided at the end of the article to a set of YouTube videos which demonstrate the process step by step.

PART MODELLING: M8 X 30 SOCKET CAP SCREW

To model a component, first enter into the part workspace (the blue L shaped symbol under 'Create New…' section of the Alibre Atom 3D home window).

The part workspace provides a main toolbar across the top, a 'design explorer' down the left hand side and a main 3D work area.

The toolbar is setup to work left to right, the very first option being '2D Sketch' – which is the basis for most function, next is the 'Boss (add material)' section with tools to add material to the model, then 'Cut (remove material)' with a set of tools to remove material (e.g. cutting a hole) and then 'Part Tools' which includes a series of tools used to refine a model (for example to add a fillet to an edge).

To create the cap screw we need to add material to the model using one of the 'Boss' tools. I find it helpful to think of how the real component would be made to determine which tool to pick – in this case a machine screw would be turned on a lathe so the 'Revolve' function is a good fit as it works in a similar way (although in this case adding material instead of removing it), to rotate a cross section around an axis.

In order to create a revolve we first need a sketch, and the 2D sketch tool requires a flat plane to draw on. As this is a new part there are no existing flat faces to work with so we can select one

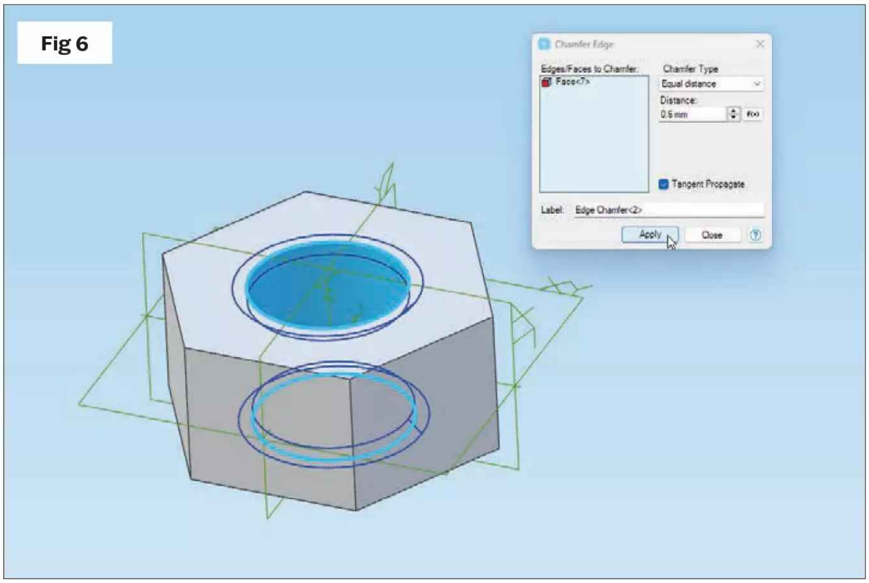


Fig 6

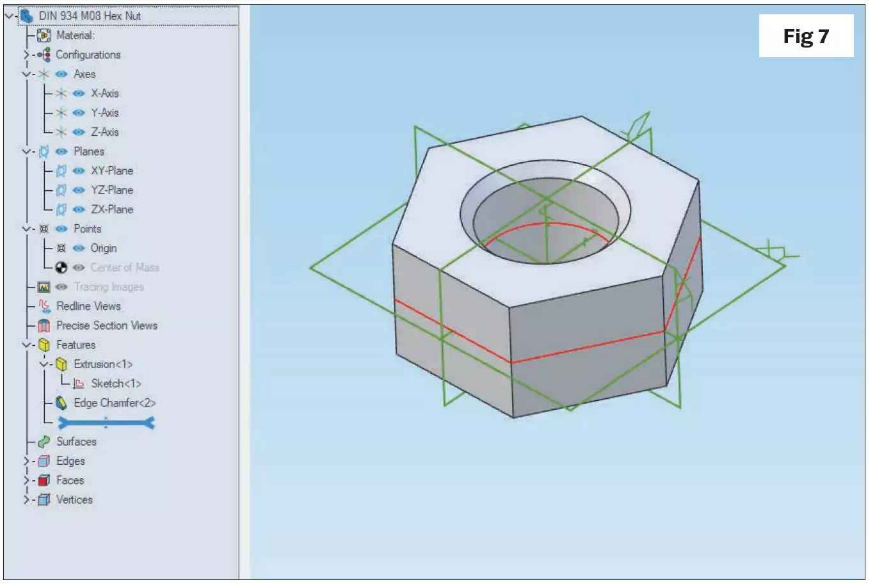


Fig 7

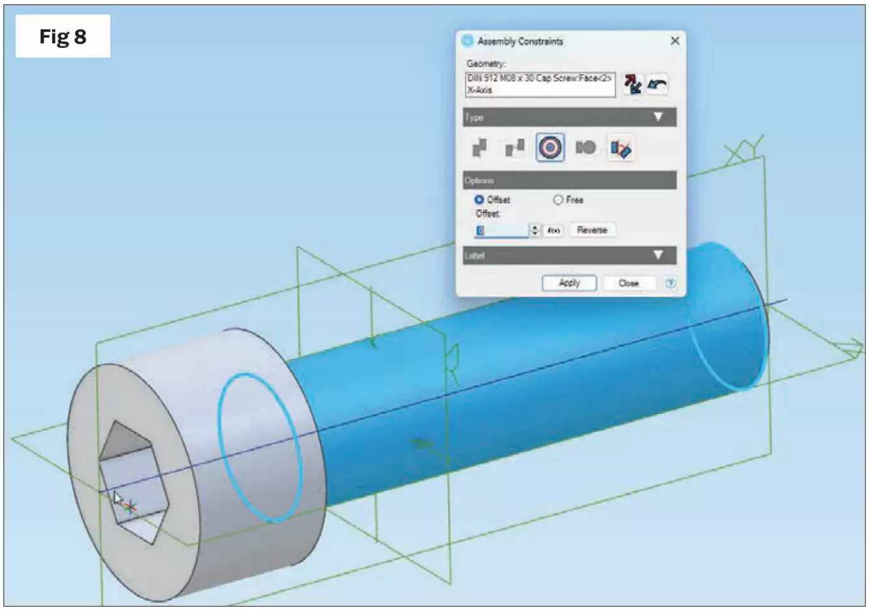


Fig 8

of the pre-defined reference planes, in this example I will select the X-Y plane as the basis for the sketch.

Once in 2D sketch mode, the toolbar changes to a 2D drawing environment and we can use the sketching tools to create a cross section as shown in **fig. 1**. It's important to keep the cross section to one side of the axis we are working around (in this case the X axis). I used the line tool the create the sketch and then applied dimensions and constraints to create a fully defined sketch as shown in fig. 1.

Once the sketch is created, we click the 'deactivate sketch' button to return to the modelling toolbar, then with the sketch selected click on the 'Revolve' function to create the body of the machine screw as shown in **fig. 2**. Set the 'Axis' option to the X axis and the angle to 360 degree and click OK to create the body of the part.

Next, we need to create the socket on the end of the bolt. To do this select the flat face on the end of the part and use this for a new 2D sketch (so the new sketch will be drawn on the flat face).

The sketch tools include a 'polygon' function that can quickly create a hexagon – this can be centred on the bolt by picking the origin point as the centre of the hexagon, and the size should be set to 6mm (across the flats) using the dimension tool.

Deactivate the sketch, and with the sketch selected click on the 'Extrude' function from the 'Cut (Remove Material)' menu on the toolbar and set the depth to 4mm with the 'Reverse' option checked such that it will remove material from the part as shown in **fig. 3**, then click 'OK'.

Finally we can finish off the part by creating a chamfer on the end of the bolt, by selecting the 'chamfer' function under the 'Part Tools' section of the menu. Set the chafer size to 0.5mm, then pick the edge on the end of bolt and hit 'Apply' to create the chamfer.

Figure 4: The finished part is comprised of three features, note that these are listed in the design explorer on the left, with the corresponding sketches nested under each feature. The features and sketches can be edited by right clicking on them in the menu and choosing 'edit'. The blue bar at the bottom of the tree (referred to as a 'dog bone') can be dragged up and down the tree to run through the creation of the part step by step.

Save the cap screw part to a folder and then close the part workspace.

M8 HEX NUT

Next, we can create a model of a hex nut. As before start by opening the part

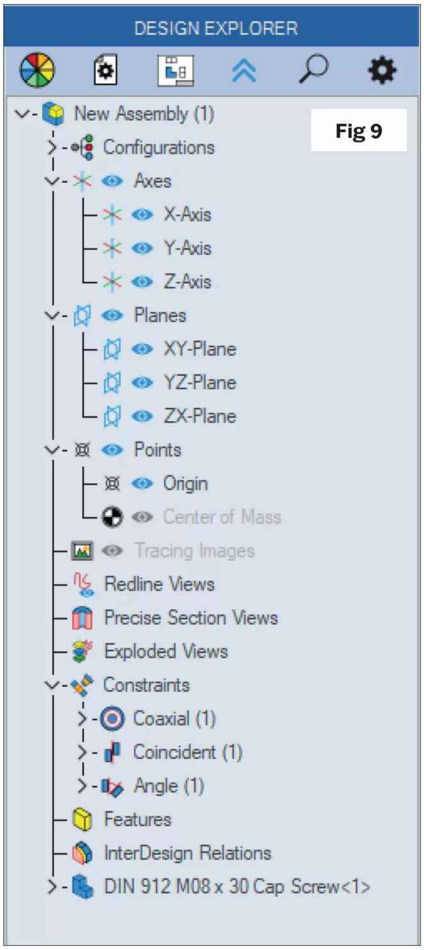


Fig 9

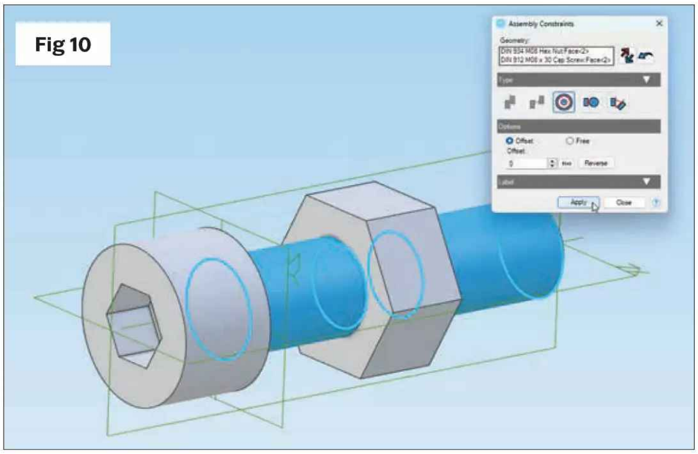


Fig 10

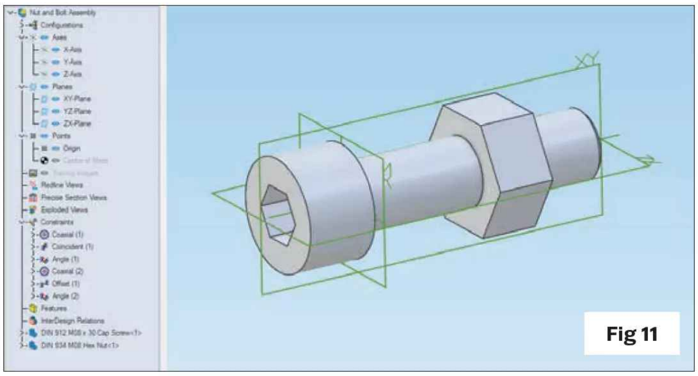


Fig 11

workspace, select the X-Y plane and then start a 2D sketch.
Create a sketch of the hex nut using the polygon tool (size should be 13mm across the flats). A useful shortcut to be aware of is that if you include a profile within another, Alibre will create material between the two, effectively treating the inner profile as a hole. Using this we can create the hole in the nut by adding a circular figure into the sketch using the same centre as the hexagon as shown in **fig. 5**.
When modelling nuts, I typically use the tap drill size for the intended thread to define the bore (in this case that is 6.8mm for an M8 course thread).
A note regarding threads: It is possible to accurately model threads in Alibre Atom 3D using the helix tools, however the geometry is complex and large numbers of threaded parts in an assembly or drawing can really slow things down. It's generally only advisable to model accurate threads if you intend to directly manufacture a part from the 3D data (I.e. if 3D printing or CNC machining a part from the model). If threads are to be tapped or die cut then the thread specification can be added as a note to a drawing, and simplified parts are recommended when being used as assembly components.
Use the Extrude option under the 'Boss (add material)' section of the menu to create the body of the nut. The 'type' option controls how the material is added to the part – change this to the 'Mid Plane' option, this will add material equally about the sketch plane instead of to one side. Set the depth to 6.5mm, then click 'OK'.
To finish the nut, we need to add chamfers to both ends of the bore. To do this use the chamfer tool under the 'part tools' section of the menu. Set the size to 0.6mm, then select the cylindrical face in the centre of the nut as shown in **fig. 6**, then hit Apply.
Note that selecting a face when using tools such as chamfer or fillet applies the feature to all edges connected to that face – in this case that applies the chamfer to both sides of the nut with a single selection, rather than having to select each edge individually.
Figure 7 shows the completed nut – note that thanks to the short cuts mentioned above, the nut only required a single sketch and two features to complete.
Save the nut into the same folder as the cap screw, then close the part work space.

CREATING AN ASSEMBLY

Now that we have a couple of components, we can use the assembly workspace to combine them together. Click on the 'Assembly' button (the blue and yellow box symbol) in the Alibre Atom 3D home window to open the assembly environment.
Alibre will bring up the 'Insert Part/Subassembly' dialogue when creating a new assembly and it should default to the same folder where the parts were previously saved (if not navigate to the folder where you saved the parts). Select the Cap Screw part file and click 'Open' to add it to the assembly.
Next, left click once in the main window to add a single copy of the cap screw into the assembly (additional clicks will add further copies – useful when working on larger models), then click 'Finish'.
This first part now needs to be fixed in position within the assembly, there are two options to achieve this:
1: The quick option is to highlight a face on the cap screw and then click on the 'Anchor' button under the constraints section of the toolbar (top left). This will fix the bolt in position and allow other components to then be positioned in relation to it. The downside to this approach is that the cap screw is in an arbitrary position in relation to the assembly reference planes, so I prefer the second method:
2: Position the first component using constraints to locate it in relation to the assembly reference planes.
To do this, click on the 'Constraints' button (top left) to bring up the Assembly Constraints dialogue. With this open, constraints can then be created between the cap screw and the assembly references. I would recommend applying the following constraints in this order:
A: Select the cylindrical face on the outside of the 'threaded' section of the cap screw, then select one of the assembly axes (e.g. the X-Axis), as

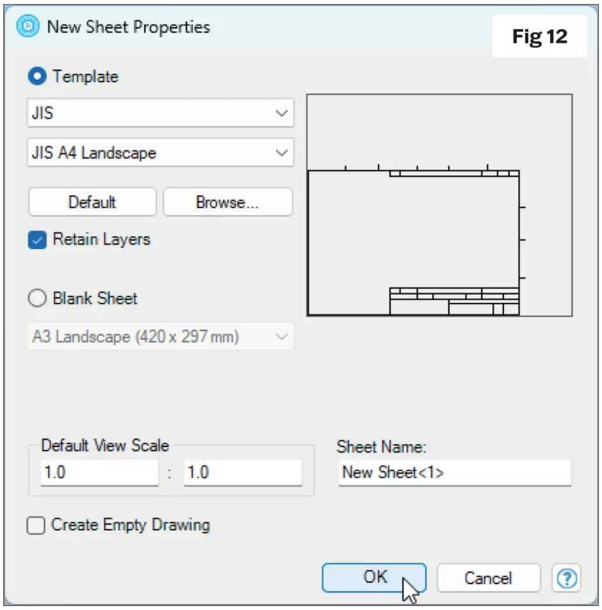


Fig 12

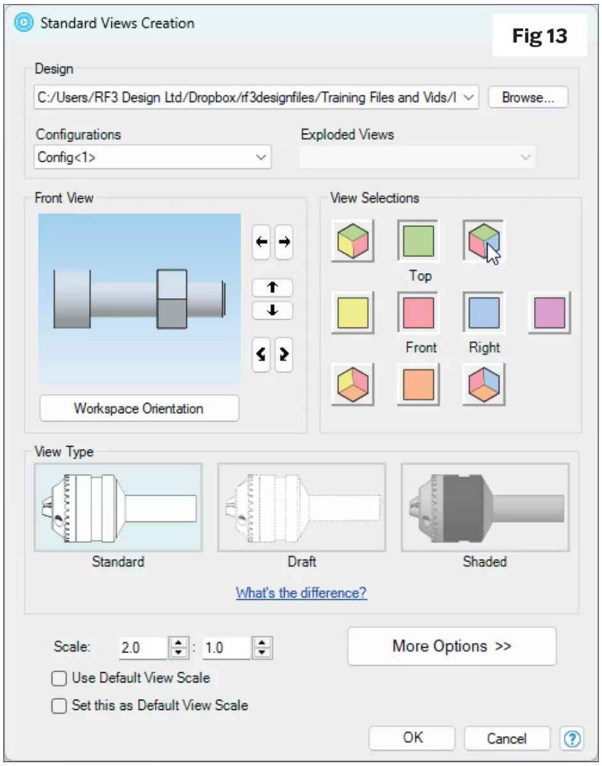


Fig 13

shown in **fig. 8**. This will create a 'co-axial' constraint between the two and centre the bolt on the axis. Hit 'Apply' to accept the new constraint.

B: Select the flat underside face of the bolt head, and then select a parallel assembly reference plane to position it against (if you used the X-Axis for the first constraint, the corresponding reference plane would be 'ZY'). This will create a 'coincident' constraint between the two and align the selected face of the cap screw with the reference plane. Hit 'Apply' to accept this constraint.

C: Select one of the flat faces in the hex socket of the cap screw, and a perpendicular reference plane (e.g. XY). This will result in a red coincident constraint being added to the assembly tree (as Alibre defaults to the last used option) and may also bring up an error message. Dismiss the error and then click on the 'Angle' button in the assembly constraints dialogue to change the constraint type. Set the angle to 90 degrees and hit 'Apply' (there should now be no errors or red constraints in the tree).

The socket cap screw will now be fully fixed in place, with no remaining degrees of freedom and there should be three constraints listed in the assembly design explorer as shown in **fig. 9**. Close the assembly constraints dialogue.

You can check if a part in an assembly is fixed or not by selecting a face, then holding down the left mouse button and dragging. If for example you had only applied the coaxial and coincident constraints (A and B), then dragging on the cap screw would cause it to rotate around the X axis. As we also included the 90-degree angle constraint the cap screw should be fixed in position and won't move.

We can now bring the hex nut into the assembly – click on the 'Insert Design' button (located in the 'Insert New' section of the menu) to jump back to the 'Insert Part/Subassembly' window, select the hex nut part file then click 'Open'. Click to place one copy of the nut into the assembly and click Finish.

Next use the assembly constraints to position the nut in relation to the socket cap screw. Create the following constraints:

D: Create a co-axial constraint between the cylindrical 'threaded' faces of the cap screw and nut (see **fig. 10**), then hit Apply.

E: Create a constraint between the flat face on the underside of the screw head and the opposing flat face of the nut. This will align the nut against the head of the cap screw as it will default to a coincident constraint. Click on the 'Offset' button in the Assembly Constraints dialogue to change the constraint type and then set the offset distance to 15mm and click Apply. This will move the nut 15mm away from the underside of the cap screw head.

F: Create an angle constraint between one of the flat faces of the nut and a perpendicular reference plane (e.g. X-Y) as detailed previously to lock the rotation of the nut in the assembly and click Apply. Then close the Assembly Constraints tool.

Figure 11: The assembly should now have two parts, positioned as shown, with a total of 6 constraints in the design explorer.

Save the assembly into the same folder as the parts (keep the assembly window open).

CREATING A 2D DRAWING

To create a 2D drawing of the assembly, click on the 'File' menu top left, select 'New' and then 'New Drawing'.

Alibre will open the 'New Sheet Properties' dialogue which allows you to choose a drawing template. Choose a standard from the first drop down menu, then you can select a sheet size and orientation from the second. I used the JIS A4 Landscape page for this example as shown in **fig. 12**. Click OK to continue with the chosen page layout.

The software will then bring up a 'Fill In Text' dialogue – these are pre-defined fields in the page title block and can be filled in later from within the drawing, click 'OK' to dismiss this dialogue.

If you create a drawing directly from the Alibre Atom 3D home window, the software will bring up a file browser to allow you to choose what part or assembly you want to create a drawing of – creating a drawing from within a part or assembly workspace skips this additional step.

Alibre Atom 3D will now bring up the 'Standard Views Creation' window, as shown in **fig. 13**. The 'Front View' (middle left) corresponds to the red square under 'View Selections' to the right, the arrows next to the preview can be used to change the orientation of this view.

The other square represent projection taken from the front view.

The 'More Options' button provides details that are applied to all views created such as hidden lines, centre marks and so on.

The other thing to note is the Scale

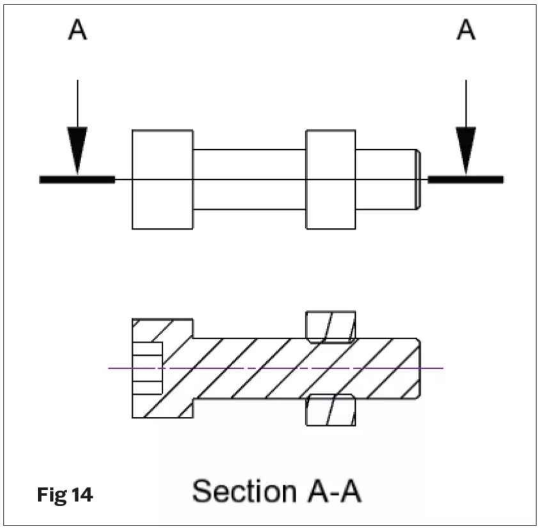


Fig 14

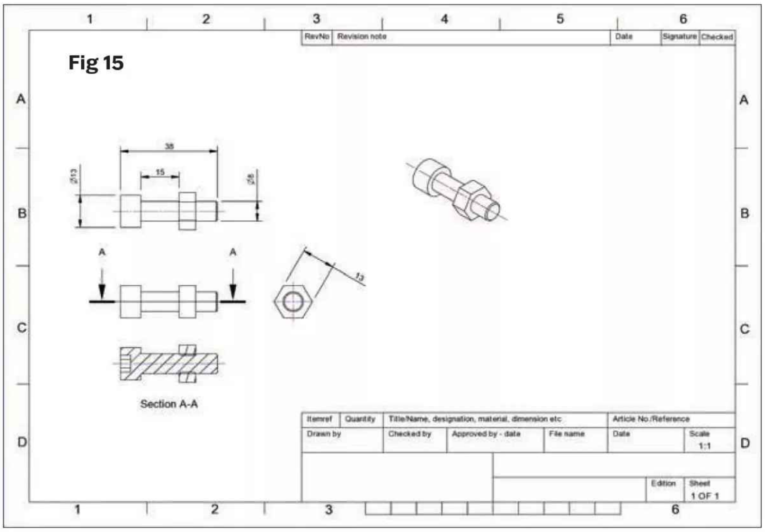


Fig 15

option towards the bottom of the window. For this part set the scale to 1.0:1.0 and then click OK.

The Drawing Workspace will now open, with blue outlines of the selected views following the mouse. Position the outlines so they fit comfortably on the sheet and left click to place the views onto the page.

Once placed, the views can be moved to provide room for annotations. Left clicking on a view will bring up a 4-way arrow, click and drag on this to move the view. Isometric views can be moved anywhere, whilst orthographic projections will maintain alignment with the primary (front) view.

If you move the front view, any aligned projections will move with it.

Dimensions can added to the drawing by clicking on the 'dimension' button on the toolbar, and then selecting the elements to be dimensioned (the dimensions are pulled from the 3D data).

Other types of views can be created for example section views, by selecting a view you wish to section, then clicking the 'Section' button. This then brings up a drawing toolset to allow you to define a section line. Once the section line is created, click 'Create View' and select which side of the part the section should be viewed from, and finally click to place the section. **Figure 14** shows an example of a section view.

Figure. 15: An example drawing of the nut and bolt assembly including isometric and section views.

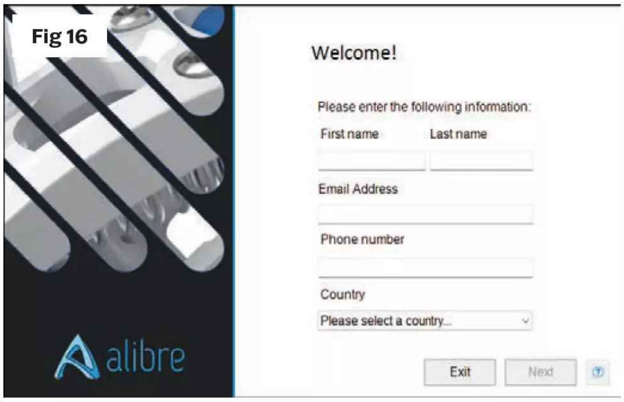


Fig 16

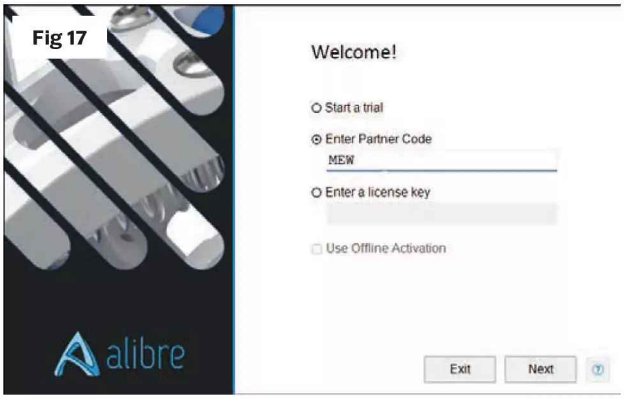


Fig 17

FREE VIDEO GUIDES AND ALIBRE ATOM 3D TRAINING COURSE

If you would like a more detailed guide to creating the parts, assembly and drawing covered in this article, we have full step by step video guides on our YouTube channel at https://www.youtube.com/@RF3DESIGN

If you would like further guidance RF3 Design offers an in depth Alibre Atom 3D training course with guide videos and step by step written instructions at: https://www.rf3dtraining.com/atom3d101 Please use code MEW2026 at checkout for an exclusive 50% discount for MEW readers.

ALIBRE ATOM 3D 6 MONTH TRIAL OFFER

To support this series of articles, Alibre have partnered with Model Engineers Workshop to provide a six-month free license of Alibre Atom 3D for readers.

To claim the six-month license, please go to https://www.alibre.com/get-a-trial-of-alibre-atom3d/ and fill in the form to request a download link.

Once you have downloaded and installed the software, fill in your details on the Welcome page (see **fig. 16**) and click NEXT.

On the next screen, click on the 'Enter Partner Code' radio button, then enter the code MEW as shown in **fig. 17**, and click Next.

This will activate the software for six months.

Please note if you have had a trial of Alibre in the past, the partner code will not work. If this is the case, please contact Alibre at the following email address to request a temporary license key: hello@alibre.com.

Roderick Jenkins makes an adaptor to allow 10mm collets to be used with the Myford screw fit spindle nose, and adaptable to other lathes.

A Pultra Collet Chuck

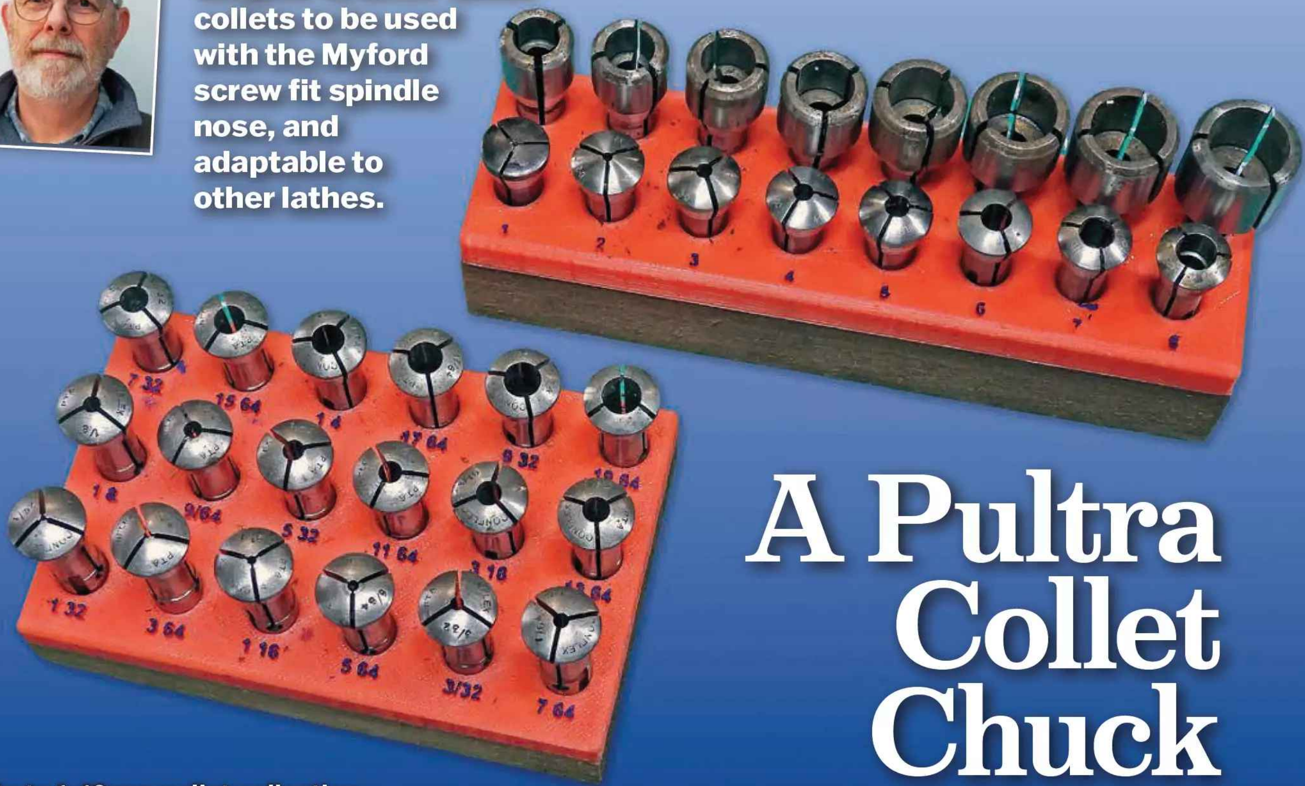


Photo 1: 10mm collet collection.

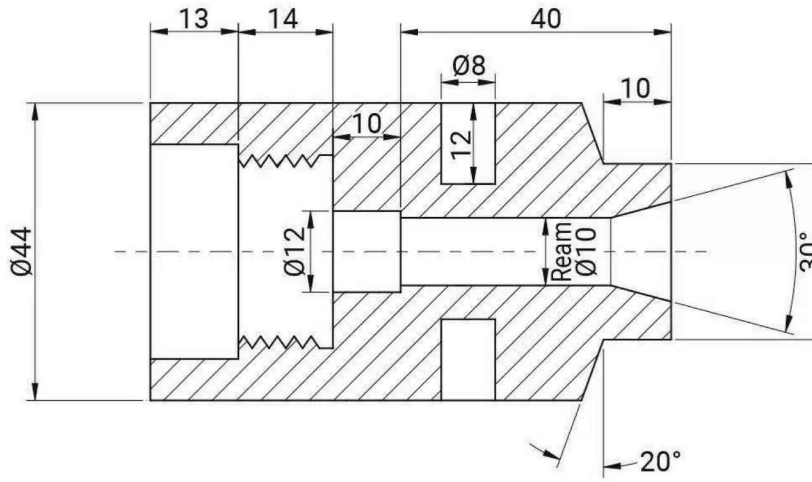
Pultra "17" series lathes are fitted for 10mm collets in both the head and tailstock. Over the years I have managed to collect a set of collets in both metric at 1mm intervals and imperial in 64ths for my 1750 lathe, **photo 1**. 10mm collets are so named because of the diameter of the shank and can hold material through the collet up to about 6.5 mm or 1/4". The larger collets in my collection are, I believe, called button chucks and while they might be useful for making ball handles for a Quorn, I have not yet found a use for them, but they are there, ready and waiting, should the need arise. Whilst the Pultra lathe is a pleasure to use, it is very simple (a plain lathe) whereas my Myford Super 7 lathe has all sorts of facilities and attachments available. It would therefore be nice to be able to use the Pultra collets in the Myford, particularly for smaller diameter work.

Pultra collets have a 10mm plain shank with a 30 degree included angle head. The collet fits into a 10mm hole in the Putra lathe spindle and is drawn into the female taper on the spindle by a hollow drawbar that is threaded 10mm x 1mm pitch to match the male thread on the end of the collet. For use in the Myford a separate chuck to receive the collets needs to be made. The drawbar must have something to push against as it draws the collet into the chuck; on the Pultra the drawbar seats against the outboard end of the lathe spindle. On the Myford I felt that a similar arrangement was rather too far away from the collet and that misalignment could tend to skew the collet in its seat which could lead to concentricity issues. Instead I designed the chuck to seat the drawbar within the chuck itself.

One of the tenets of my engineering philosophy is "If you can't make it accurately, make it adjustable". This was a lesson I learnt when I bought an ER collet chuck that screws on to the nose of my Myford lathe. This had unacceptable runout and I wished I had bought a collet chuck that could be mounted on a back plate. However, I found that I could trim the taper of the

Photo 2: Internal view of the chuck machine to fit a Myford spindle nose.

Fig 1

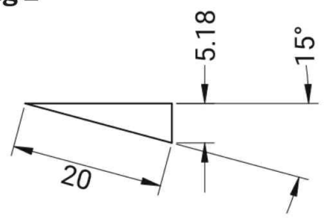


pull the register out of alignment.

I made a start by first making a go/no-go gauge with a 1 thou difference for the register diameter and mounting a mild steel billet in the 4-jaw independent chuck for boring the spindle thread minor diameter. I then screw cut the nose thread before boring out the register for a snug fit on the go/no-go gauge. The 12mm diameter seat for the drawbar was drilled and then I (slowly and carefully) used a 12mm end mill held in the drill chuck to give it a flat bottom since it was rather too deep for a small enough boring bar. The dimension shown on the drawing allow the draw bar to engage about 4 threads on the collet before it bottoms on the 12mm hole and starts to pull the collet against the tapered socket. **Photograph 2** shows the thread, register and drawbar seat. Two holes 180° apart were drilled for a tommy bar. I chose 8mm (5/16") since this is the same size as on my ER chuck and is, conveniently, the size of the cross bar on my 3-jaw chuck key which I use as my tommy bar.

The part made chuck could now be reversed and screwed on to the nose

Fig 2



hardened chuck in situ with a boring bar with a ground (CCGT) carbide tip and it has since given very accurate and repeatable service. As this 10mm collet chuck was to be used on the lathe that made it I felt that I could achieve good accuracy with a screw on chuck. **Figure 1** shows a cross section of my design.

As I have stated, my chuck was designed to screw on to the nose of the Myford Super 7 lathe. I will not go into the details of cutting the thread and register since this has been covered before in both *Model Engineer* and *Model Engineers' Workshop*. I will add though that when making a chuck or back plate that screws on to a lathe nose it is the register that ensures accuracy and repeatability, so this is the important feature. The thread can be an easy fit to ensure that it does not

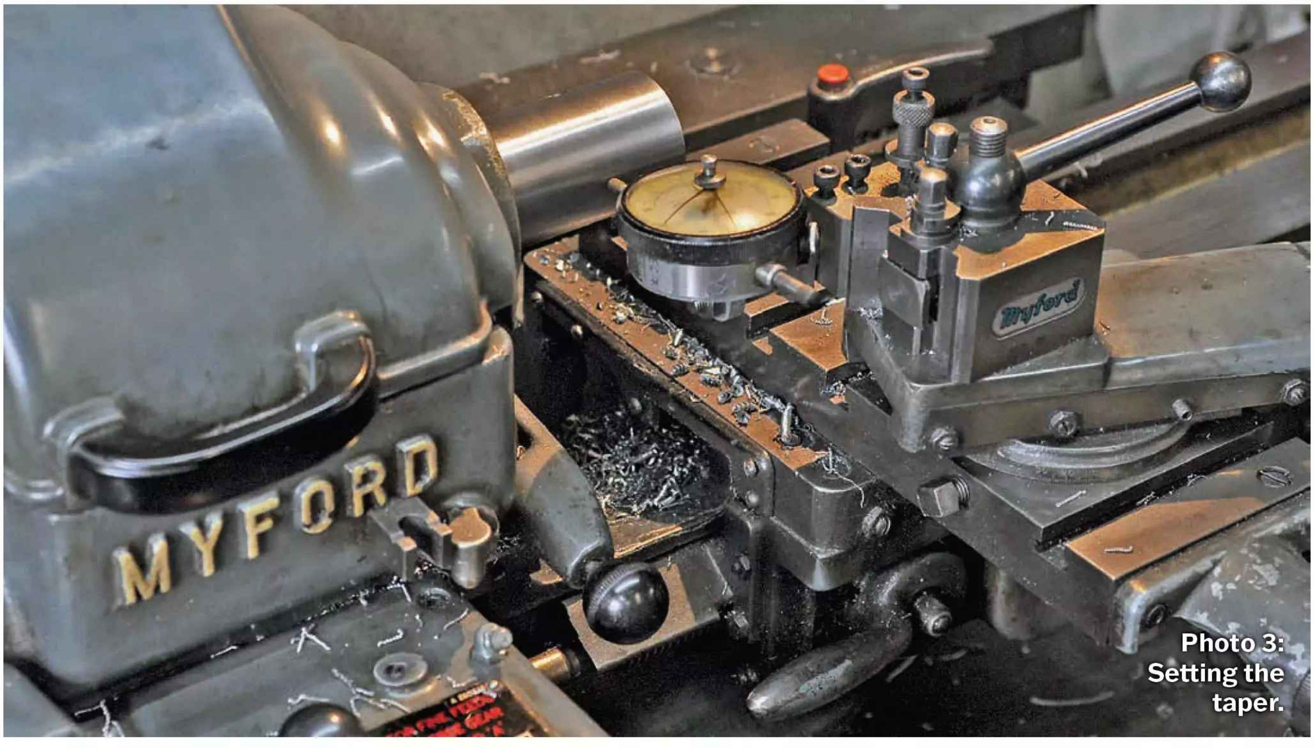
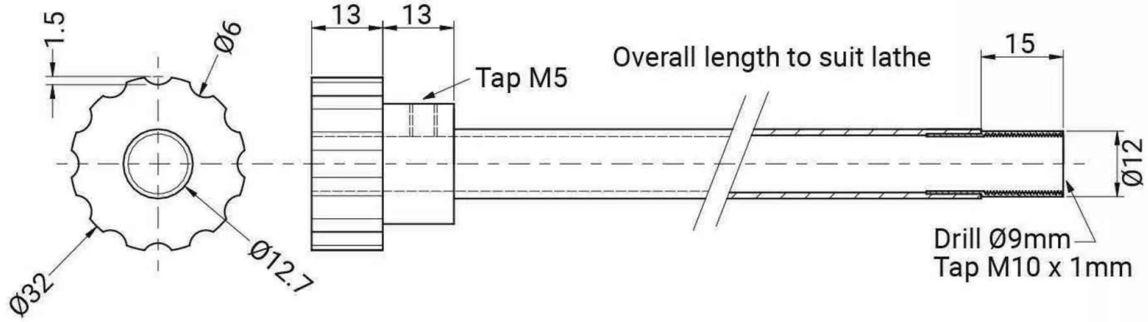


Photo 3: Setting the taper.

Fig 3



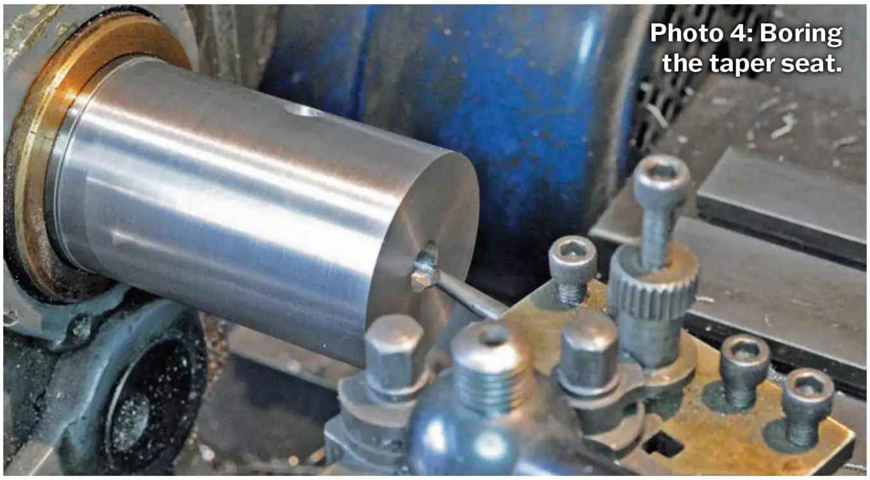


Photo 4: Boring the taper seat.

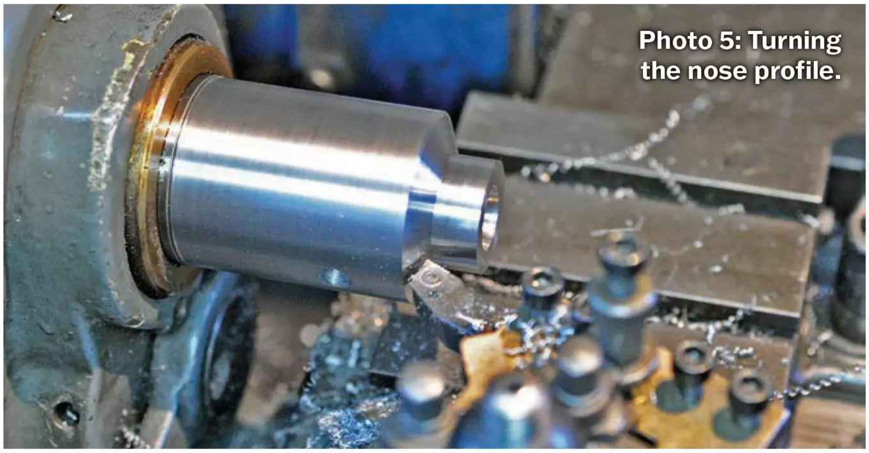


Photo 5: Turning the nose profile.


Photo 6: Tapping the draw bar end.

of the Myford for finishing. The through hole was drilled and reamed 10mm. The tapered seat for the collet is a precise 30° included angle so in order to cut the taper the top (compound) slide needs to set over to 15°. The scale on the top slide will get us to approximately the correct angle but to set that angle more accurately we can set up a dial indicator perpendicular to the chuck and monitor the reading as the top slide is wound in. Trigonometry will give us the relevant figures, but we can get a CAD program to do the sums for us as shown in **fig. 2**. I nudged the top slide around until the dial indicator consistently showed a movement of 5.18mm when wound in for 20mm, **photo 3**. The taper was turned with a small boring bar until a collet could be inserted such that the taper on the head was just proud of the chuck, **photo 4**. As a rough guide, the diameter at the outer end is about 15mm. Traditionally, much of the work on small lathes using this type of collet is undertaken using hand gravers so I profiled the nose of the chuck to provide room for knuckles, a much-preferred option to a conventional 3-jaw chuck, **photo 5**. I would point out here that the chuck was made from EN3 steel which has a poor reputation for surface finish. I did all the turning with CCGT 060204 ground carbide tips without any cutting oil which left a fine finish needing no further work.

Figure 3 shows the drawbar which I made from a length of ½" (12.7mm) outside diameter by 16SWG (1.6mm) welded steel tube. The draw bar needs to be threaded 10 x 1mm, taps for which are readily available since it is a common size for small spark plugs and I already have a set used for making both my Wyvern and Hoglet engines. Sadly, the internal diameter of this tube was just a little bit larger than the required 9mm tapping size. I overcame this problem by turning a 25mm length of ½" (12.7mm) solid mild steel down to a sliding fit in the 12mm diameter recess in the

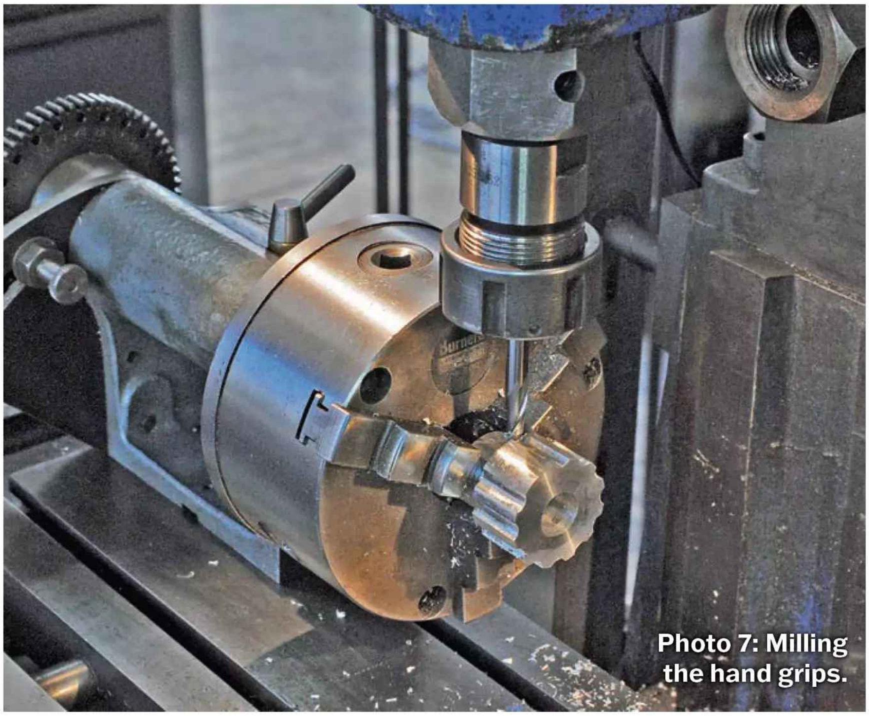


Photo 7: Milling the hand grips.

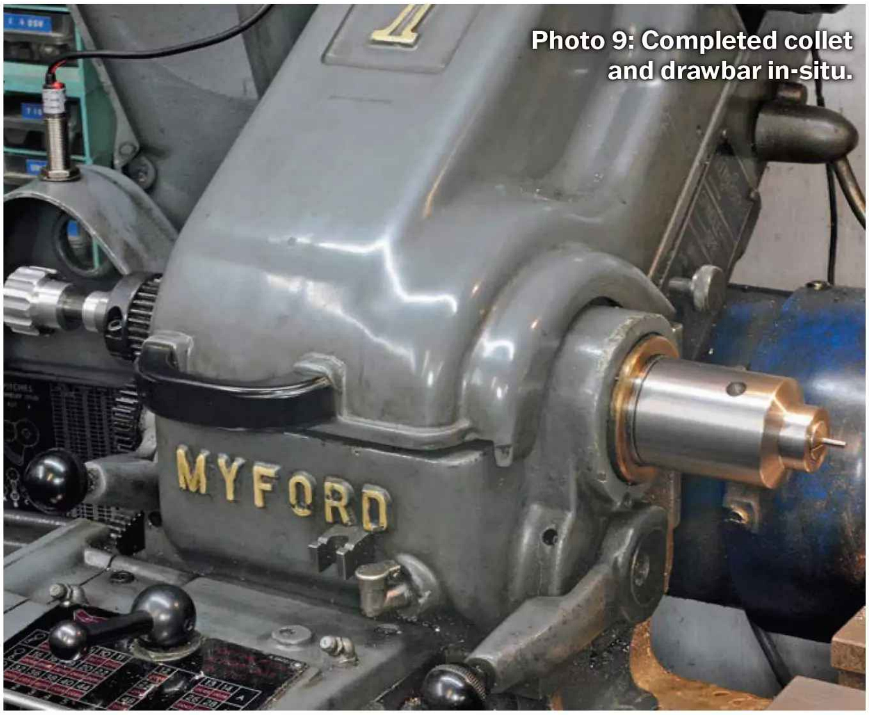


Photo 9: Completed collet and drawbar in-situ.

chuck, drilling this through 9mm and then tapping the 10 x 1mm thread to a depth of 15mm, **photo 6**. The inside of the welded tube was opened to 11mm ID with a boring bar to depth of 10mm. The non-threaded end of the steel bar was turned down to a shade less than 11mm for a 10mm length to be an easy fit when inserted into the welded tube. I then silver soldered the two parts together.

The knob on the end was turned from a bar end of aluminium alloy and fastened in place with a 5mm grub screw. The furrows were made with a 6mm diameter ball ended milling cutter as shown in **photo 7**. I prefer this style of grip rather than a knurl for grasping in the palm of my hand.

One final item I made was a collar to stop the drawbar from rattling around in the lathe spindle. This collar was turned up from a scrap of aluminium to be a sliding fit on the draw bar. I turned a slight taper on the collar so that it would locate in the spindle through hole. This is shown on the completed draw bar, **photo 8**.

Photograph 9 shows the chuck in situ, loaded with some 4mm (5/32") silver steel that will be turned into a button for making a gear cutter on the Eureka device. It will be noted that I have not included an anti-rotation pin to register with the collet key way. I have not, as yet, found this to be necessary: I suspect that the fact that the chuck is not hardened probably supplies sufficient friction to stop the collet rotating once it is pulled into the taper. A pin can be retro-fitted if required. Although this collet chuck was designed to fit Myford series 7 and 10 lathes it could be adapted for any type of nose fixture or even, with careful centring, held in a 4-jaw independent chuck.

So, having done all that, we need to address the elephant in the room: Is it accurate? I have installed a variety of the collets with milling cutters and measured the run-out of the shanks. I have also removed and re-installed the chuck several times. The maximum TIR I have noted is 0.015mm or half a thou with which I am very happy. ●

Photo 8: Completed drawbar.

The Midlands Model Engineering Exhibition 2025

John Arrowsmith reports on the Club stands.

There were thirty-five Club and Society stands at this year's exhibition and what a show of UK model engineering skill it was. There were excellent stand presentations combined with top-quality model engineering on show. I hope my notes will give you a flavour and persuade your club to enter next year. Let's begin with the winners of the Best Club Display for the Society Shield Trophy. Judged by the stand holders, Meridienne have no input to this competition, but Bridget Deith, wife of exhibition founder, the late Chris Deith, presents the awards. The winner was the Harlington Locomotive Society. Their display, **photo 1**, consisted of a sectioned locomotive repair workshop with a range of locomotives and activities on display. Outside the shed a storage road had superb 5" gauge steam locomotives on show. In second place the Coventry MES stand, **photo 2**, was an excellent eclectic mix of fine model engineering models with useful workshop accessories, such as a *Colyer Case Tool Grinder*. Third place was awarded to the Northampton Society of Model Engineers for a fine display of Model Engineering models, **photo 3**.

Many clubs and societies had outstanding models on show which could have been well placed in the Competition Classes. On the Melton Mowbray display the Foden Speed Six Steam Lorry built by Norman Smedley was a superb piece of work, **photo 4**, a mirror underneath gave the chance to see the cam box in action as the engine turned over. Some excellent rolling stock models and a 4" scale Traction engine accompanied by some fine stationary engines provided an overall interesting display. The Model Steam Road Vehicle Society provided several models to be admired. They were adjacent to the Steam Apprentice Club for young engineers who are interested in traction engines and who provided a glimpse into their activities, **photo 5**. Another regular attendee is the Stirling Engine Society who had many working examples of this intriguing branch of model engineering, **photo 6**.

The larger gauges of the hobby had fine examples on display. The large Class 60 locomotive (see my display class report) was representing the 10¼" Gauge Society as well. The 7¼" Gauge Society had one of the late Gerry Clarke's locomotives on show, **photo 7**, along with an LNER N7 0-6-2 tank locomotive under construction by Andy Harvey which is looking very good. The Nottingham SME display had an excellent 14XX Tank locomotive in 7¼" gauge under construction by Alan Gent along with other locomotives and a nice traction engine Water Cart by Nigel Ball, **photo 8**. Both the Federation of Model Engineering Societies and the Northern Association of Model Engineers showcased the support they offer to societies and clubs in UK and provided information regarding boiler testing and insurance.

Visitors interested in the high-tech aspect of model engineering could do no worse than admire the display by the Gas Turbine Builders Association of complex and detailed models.

Photo 1: First Place in the Club Shield Competition went to The Harlington Locomotive Society.

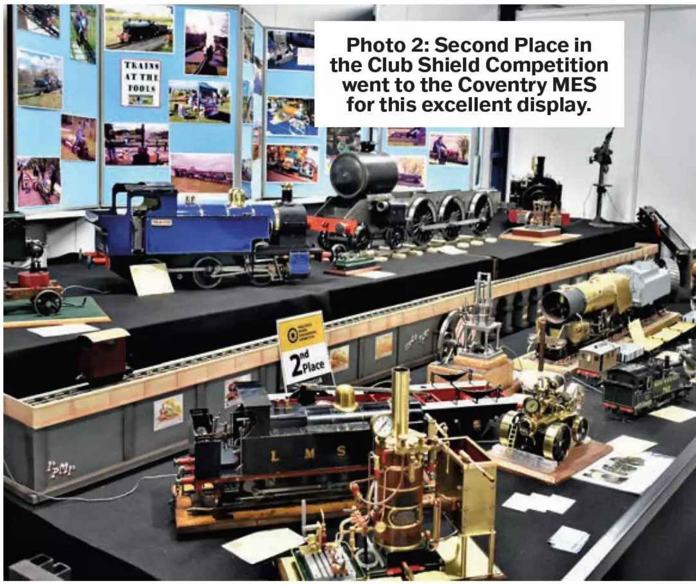


Photo 2: Second Place in the Club Shield Competition went to the Coventry MES for this excellent display.

Photo 3: Third Place in the Club Shield Competition was given to the Northampton SME

Photo 4: The Foden Speed Six Steam Lorry built by Norman Smedley.

Photo 5: An array of models and projects by the Steam Apprentice Club.

In addition the group provided popular outdoor demonstrations. One of the gas turbine engines coupled through a gear box to an engine driven propeller was developing 15lbs of thrust running at 160,000 rpm.

The Birmingham SME showed their range of activities. An immaculate Gauge 1 train showed some excellent work and combined nicely with larger gauge models on the stand, **photo 9**. The Gauge 1 Model Railway Association had well-made models to show what this gauge can offer, with lots of photographs and leaflets. A new club this year was the Gauge One 3D Circle who presented a display using 3D printing as a basis for their models. A selection of printed models produced using different technologies included demonstrations of CAD software and filament and resin printers.

The National 2½" Gauge Association showed models with casting patterns for various components. The Gauge 3 Society is the scenic side for the 2½" gauge enthusiasts and caters for some excellent railway layouts in full scenic settings. The photographs on the display show just what can be achieved in this gauge both from the movements and details that can be achieved these days, **photo 10**.

Echills Wood Railway showed off their excellent facilities and track. They have regular events which feature club and visiting 7¼" gauge locomotives and rolling stock. Try and attend during 2026 you will not be disappointed. The London & North Western Railway Society has a large photographic display of times past on this railway along with excellent LNWR locomotive models. Hereford SME brought an eclectic mix featuring excellent boats, modern wooden engineering prototypes and examples of traditional model engineering, **photo 11**. The Knightcote Model Boat club, **photo 12**, had boats and marine craft of every description. I liked the rowing boat operated by a drum to provide the oarsmen with the rowing rhythm, very clever. Across the aisle from the boat club were the combined talents of the Model Engine Makers, who displayed finely made aero engines for two days and then a selection of i/c engines for the other two days. This made for some excellent comparisons and provided plenty of interest for visitors, **photo 13**.

Nearby, Erewash Valley MES showed locomotives and rolling stock from Gauge 1 to 5"and it was good to see the differences like this, **photo 14**. We hear lots of talk these days about getting younger people interested in model making, the display by the Young Engineers (see photos in my first report) led by Pat Hendra certainly gave a good look at what young people can do when given the chance. Models from simple card models to a 3D printed working model of a Formula 1 Steering wheel.

Adjacent was the double stand of the Wolverhampton & District MES displayed traditional regulars like stationary engines and locomotives to a unique mechanical man dressed up as Ffestiniog Railway Guard, **photo 15**. This demonstrated the movements of the sort a train guard would do. The model regularly features on their demonstration train, which provides entertainment to waiting passengers. The Welwyn Garden City SME display, **photo 16**, contained several models constructed from kits

Photo 6: The traditional display by the Stirling Engine Society


Photo 7: Gerry Clarke's superb 7¼" gauge *Afon Glaslyn* on the 7¼" Society stand.


Photo 8: 4" Traction Engine Water Cart built by Nigel Ball from Nottingham.

and they appeared very authentic. Boats, armoured vehicles and road vehicles made up the majority and the Armourtec Jagdpanther G2 tank destroyer looked a well detailed model.
The Society of Ornamental Turners, **photo 17**, always have fascinating artefacts, combined with regular demonstrations of this particular way of using a lathe. The display by the Midlands Meccano Guild provided a touch of nostalgia. The impressive display by the Society of Model & Experimental Engineers(SMEE) never fails to attract visitors to see the workshop demonstrations along with excellent models, some right up to date and others from their extensive archive.
This year they featured a CNC Router, **photo 18**, a woodworking machine adapted to machine softer metals like aluminium and brass. It had a DRO that enabled very accurate machining to take place. The City of Oxford SME had excellent models on their display including some new build chassis for 7¼" and 5" gauge along with a fine model of L& B locomotive No. 762 *Lyn*. Bromsgrove SME brought a great mix of models including small stationary engines and Bugatti Railcar of the 1930's.
Outside the main exhibition halls the Fosseway Steamers provided plenty of action to entertain the visitors, with impressive traction engines and associated equipment. Visitors can get up close and discuss the engines and their performance with the owners, **photo 19**. A nice demonstration set up with a 3"scale traction engine coupled to a scale baling machine showed how these machines would have looked during harvesting. A pair of 2" scale Fowler BB1 engines were demonstrated ploughing using a separate plough pulled between them.
I hope this brief look at the club stands and demonstrations illustrates the range of models on show but also the wealth of talent that still exists in the UK today. Of course people are getting older and the skills of the past are diminishing but look at the range of new processes and materials that are now available, which enable model engineers to build to a much higher standard. In many cases, small details which in the past took hours to make, can be 3D printed or laser cut with great accuracy. The digital age in which we all live now is changing how model

Photo 9: The fine display by the Birmingham Society.

Photo 10: The colourful Gauge 3 Society collection.


Photo 11: A colourful display by the Hereford SME.

Photo 12: A large display by the Knightcote Model Boat Club.

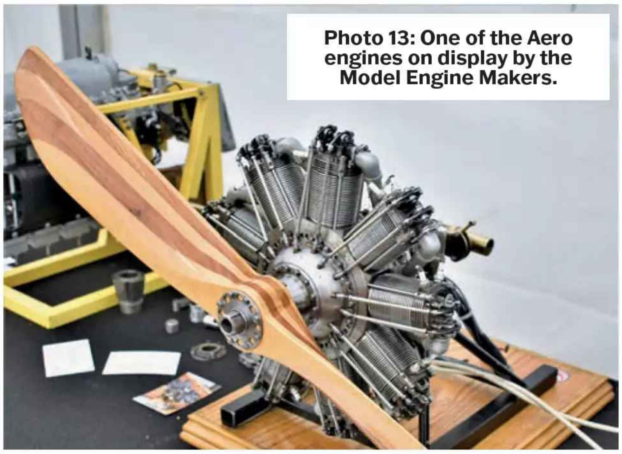


Photo 13: One of the Aero engines on display by the Model Engine Makers.

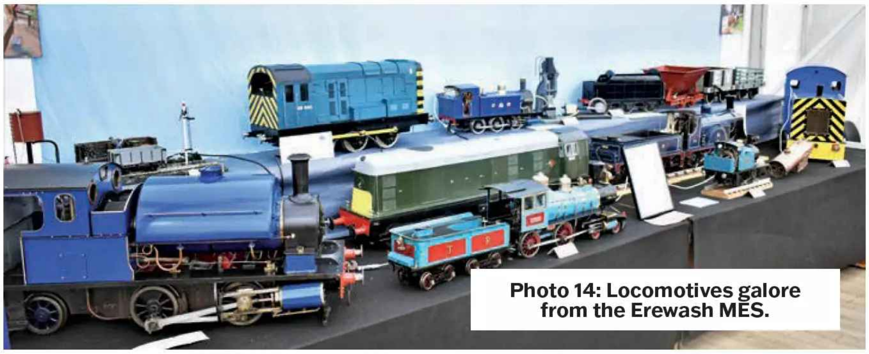


Photo 14: Locomotives galore from the Erewash MES.


Photo 15: Working Mechanical Guard on the Wolverhampton stand.


Photo 16: Various models from the Welwyn Garden City SME.

Photo 17: An excellent display by the Society of Ornamental Turners


Photo 19: A line up of the Fosseway Steamers.

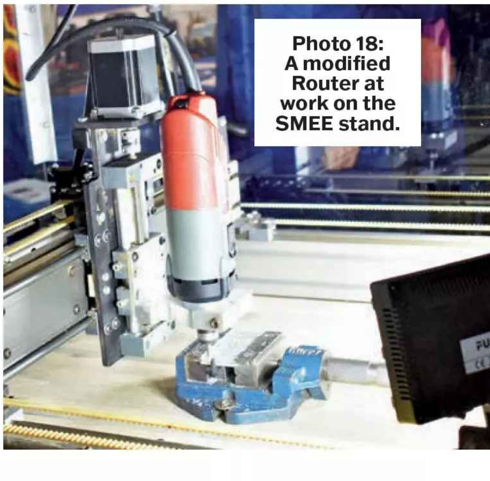


Photo 18: A modified Router at work on the SMEE stand.

engineers work but they will continue and display their work at exhibitions like this. My thanks as always to all the stand holders and the outside demonstrations which showed to me a healthy and high quality hobby which is still very much alive. I hope you will all support the exhibition in 2026.

Finally, a new model engineering exhibition is being promoted for the South West of the UK over the weekend of the 15th/16th of May at Newton Abbot. Look out for the details and make a note in your diary, I am sure they will appreciate your support.

On the Wire

News from the world of engineering

LittleLEC 2026 Announced

This year LittleLEC will be held on Saturday 20 to Sunday 21 June 2026 at South Cheshire Model Engineering Society.

LittleLEC is an annual locomotive efficiency competition for drivers of small locomotives weighing less than 50lb dry. These are much more challenging to drive than larger ones, and so this competition was devised by Peter Langridge in the 'noughties', enabling owners of small locomotives to take part in an IMLEC style efficiency competition. Full details can be found on the LittleLEC website, http://www.littlelec.co.uk/home/

South Cheshire MES last hosted LittleLEC in 2016 and we are looking forward to hosting it again in 2026. Our track is located behind The Peacock public house at 221 Crewe Road, Willaston, near Nantwich. CW5 6NE. Access to the site is at the back of the pub car park. Competitors will be able to park their vehicles adjacent to the track and additional parking is also available within the site.

The Society was founded in 1968 and has around 120 members. We moved to this location in 1991 and since then we have steadily developed the track. A recent addition is a large, raised Gauge 1 layout. We have two raised tracks. The larger of the two is 1265ft long and caters for 3½" and 5" gauge models The smaller track is 520 feet long and can accommodate 2½", 3½" and 5" gauge. The maximum gradient on the larger track does not exceed 1 in 100, whereas the shorter inner track is almost level. There is a four-road covered steaming bay with access via a powered lifting platform. 12V and 24V supplies are available for steam raising and we are fortunate in having mains water, electricity and drains at the site.

For anyone looking for overnight accommodation there is a Premier Inn located behind the Peacock Pub and immediately adjacent to our site. Contact via their website or 0333 321 1335.

Closing date for Entries is 15th May 2026. Entry Forms are available from the LittleLEC Co-ordinator: littleLEC@gmes.org.uk

South Cheshire Model Engineering Society

A Model Engineering show for the South West

Rob Speare writes: Our region of the Country has been home to many famous names: Thomas Savery, Goldsworthy Gurney, Richard Trevithick, Henry Stothert, Isambard Kingdom Brunel, George Jackson Churchward, and many others who helped to advance the development of engineering. Through our own individual projects as model engineers, we often replicate older machines as working miniatures, helping to keep the understanding of those technologies alive for a modern audience.

Many years ago, BSMEE used to hold an annual model-engineering exhibition; where many such models were displayed – a show still held in high esteem by many.

But the exhibition scene has changed, prices for large venues have escalated, and Covid-19 dealt a blow to many things, including shows. But also, traders, once a major source of income for exhibitions, can access fast internet to sell their wares on-line; so, have less need to attend shows.

Sadly, the only regular major show we have left, is the Midlands Model Engineering show. It may be a good show, but for many it's a long trip from the South West, possibly involving an overnight stay.

However, there is still much interest in model making; model railway shows are still popular, and those that enjoy smaller railway gauges often enjoy larger scales too; proven by the continuing popularity of Ashton Court Railway.

After the Bristol M.E. show ceased, there were a couple of independent attempts to stage a new show at Exeter, but those ideas came to nothing.

Then, last year at the Exeter Garden railway show, enjoying the atmosphere, some members from several model engineering clubs that were represented there, mused on how it would be good to have a show for larger gauges, in the region.

That was the catalyst, prompting a search that brought up Newton Abbot racecourse as a suitable venue in the area. Then, after finding the site, some time was spent contacting other Societies in the South West, along with key traders, to see if this was actually viable; no point in having an empty hall! And for all the effort that goes into putting on a show, it was felt that opening for two days works best, leaving Sunday free as a day for club running, and for traders to have a day off.

So, the 2026 show at Newton Abbot racecourse on Friday 15th and Saturday 16th May, is a collaboration of model engineering Societies from a reasonable radius, supported by traders and related interest groups. Setup will be available on Thursday 14th from about 2.00pm; and cleardown on Saturday late afternoon.

Indoors there is a well-lit indoor exhibition area, but it is subject to a strict no fires or flammable liquids rule, although movement powered by silent electric compressors etc. is welcome. Outside, live steam is encouraged; traction engines with appropriate boiler certs and insurances, will have the run of the concourse area.

Any profits from this Show will go to cancer support charity. The reactions so far to the new show have been entirely positive, and this should be good for South West model engineers, and a great opportunity to display a different set of models than is seen at the Midlands show. Hope to see you there.

Steve Goodbody concludes his Butterside Down adventures with a two-nation epilogue.

Part 28

Two Days In June


Photo 146: A battery-electric diesel winds through the curves on the 7 ¼-inch gauge track, a selection of scale wagons behind.

Once in a while, not often but every now and then, the stars and planets align, and an opportunity presents itself which simply cannot be ignored. As some readers may recall, two model engineering organizations hold my allegiance, one in the old world and one in the new, and it so happened that, at the beginning of June of this year, on back-to-back weekends, each was to celebrate an important event in its history, and, for the first time ever, I found myself able to arrange my schedule to be on the right continent at the right time to attend both.

Photo 147: The wagon's quality of workmanship, paint and artwork defies superlatives.

PASTURES REVISITED

Now, despite the two nation's historical differences, in my experience and contention, having a broad viewpoint and a foot in both camps, so to speak, I strongly believe that, once you scratch

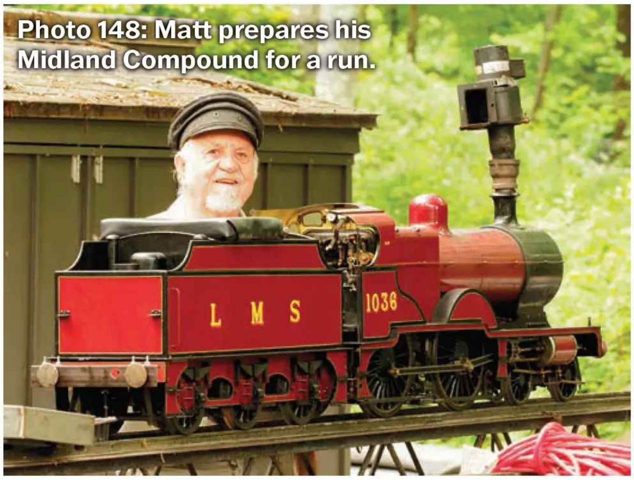


Photo 148: Matt prepares his Midland Compound for a run.

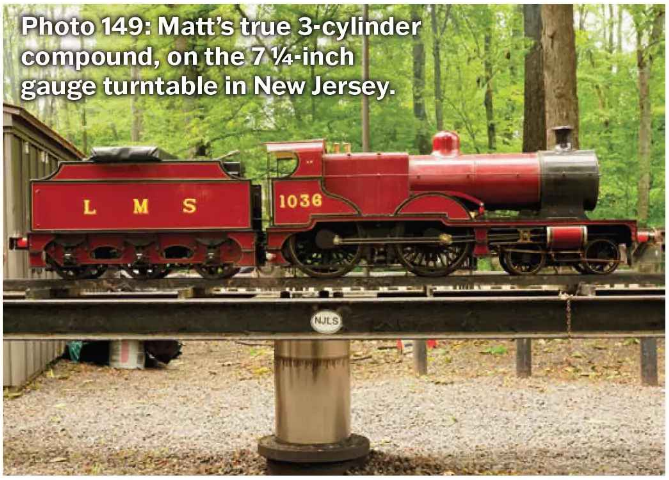


Photo 149: Matt's true 3-cylinder compound, on the 7 ¼-inch gauge turntable in New Jersey.

beneath the surface, people are much the same, everywhere, and these two events, divided by distance yet wholly united through our common interests, occurring just one week apart, serve to illustrate the point rather nicely.

So, without further ado, for the first of this two-part epistle, and the final instalment of *Butterside Down*, let's transport ourselves to the rolling Bedminster Hills of New Jersey in the US of A, on the first weekend in June of this year, and see what's going on.

SPRINGTIME AT THE NJLS

At the risk of expounding a blatant contradiction within the space of only three paragraphs, to me, our hobby's greatest strength must surely be its diversity, for the world of *model engineering* is a remarkably broad church. Your interest may be more stationary engines than railways, electrical propulsion may be more appealing to you than steam or internal combustion, and your workshop may be more computer-controlled than handwheel-driven, but it really matters not, for there is something for everyone under the model engineering banner, each bringing its own unique flavour to the banquet.

With this in mind, as I wandered around the New Jersey Live Steamers' grounds on the occasion of its Spring Meet during the first weekend of June, the breadth and scope of its member's interests and achievements, all shoe-horned into a mere few acres, drew my attention hither and thither: the more I looked, the more I saw, and, of course, the more I saw, the more… you get the picture.

Entering the site past the clubhouse, a venerable building with a wide garage-door frontage and the centre of the club's practical and social activities throughout the year, I came first upon the 7 ¼ inch track at ground level, a magnificent battery-driven model of a diesel locomotive winding through the curves with a row of scale wagons, **photo 146**, each of them different and one even containing a trio of mid-twentieth-century tractors apparently on their way to an agricultural dealership somewhere in the Midwest, **photo 147**. As I studied the train more closely, I saw the superb quality of the workmanship, the beautiful paint, and the exquisitely executed artwork, realizing that, no matter where we are, or whether we are especially interested in railway wagons or not, these studies-in-miniature were excellent exemplars of our hobby: taking full size prototypes and recreating them as functioning models to the very best of our abilities.

Wandering further, past the full-size signals, the cast iron signs and the other historical paraphernalia which the club has rescued, restored and maintained throughout its sixty-four-year history, I arrived at two sets of steaming bays, each with its own turntable, the first of which, catering exclusively for the ground-level 7-¼ inch gauge loops which intertwine around the site's perimeter, presently hosted a beautiful Midland Compound, the real thing: a recent immigrant, being prepared by its new owner Matt, an ex-BR fireman himself and originally hailing from the East Midlands, **photos 148** and **149**.

Standing for a moment to take it all in, a locomotive, Tom's Atlantic, in typically American working clothes of black-on-black and with father Ed at the controls, drifted serenely down the grade towards the station, injector on and safety valves feathering, **photo 150**, all ready for the next trainload of invitation-only passengers at the station, **photo 151**. As the battery-powered diesel with its wagon-train drew near, I spotted a pint-sized trespasser and vowed to keep my eyes

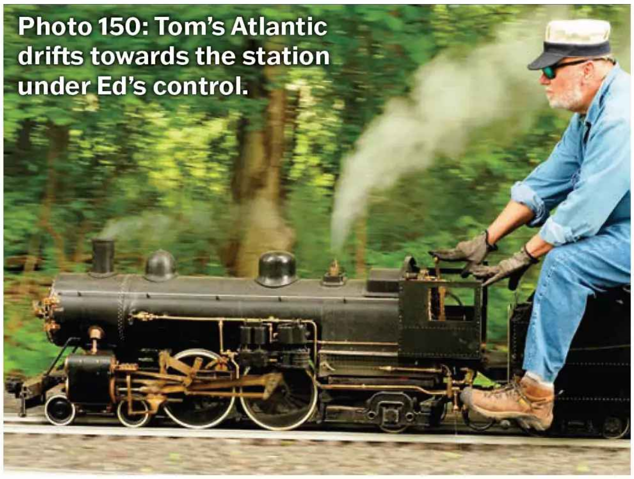


Photo 150: Tom's Atlantic drifts towards the station under Ed's control.

Photo 151: In the station, a youngster prepares to drive the Atlantic under Tom's supervision, while Glenn (kneeling) readies his mogul for the next train of passengers.

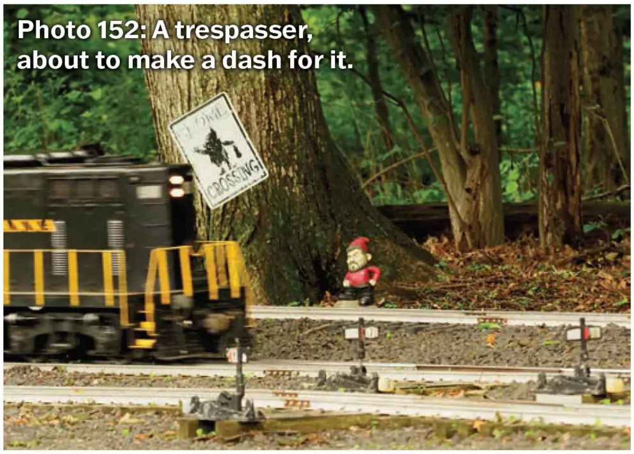


Photo 152: A trespasser, about to make a dash for it.

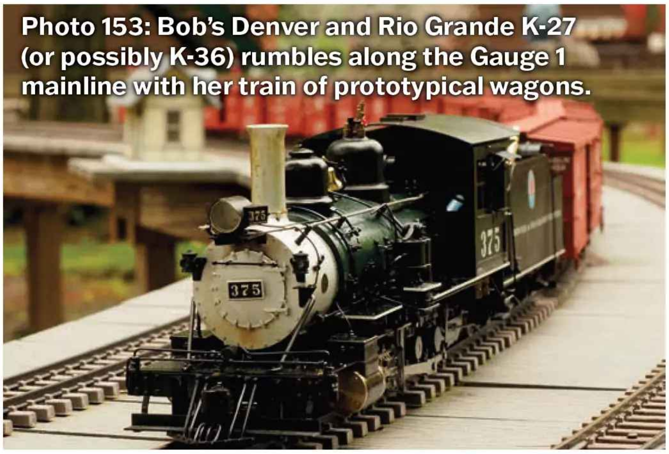


Photo 153: Bob's Denver and Rio Grande K-27 (or possibly K-36) rumbles along the Gauge 1 mainline with her train of prototypical wagons.

peeled for other such whimsies; there are many dotted around to amuse the keen-eyed younger visitors to the club **photo 152**.

Eventually, as an exquisite Denver and Rio Grande K-27, or perhaps K-36, I can never tell them apart, rumbled sedately along the extensive Gauge 1 layout, its prototypical train of boxcars following obediently behind, **photo 153**, I reached the club's central building, an innocent cupola-topped shed nestled behind the raised-track bridge and the elevated track's water tower, a plume of blue smoke rising into the air from a jauntily-angled chimney protruding from its roof, and stuck my head inside to say hello, **photo 154**.

SPINNING WHEELS

Now before I continue, let me preface the following by saying that, in my view, something that makes the New Jersey Live Steamers uncommon, perhaps even unique among its national and international peers, is that the club has an enthusiastic interest in an often-overlooked branch of the hobby: the building and restoring of stationary steam engines of many types and all sizes. Furthermore, and importantly, over the years, thanks to a lot of hard work and dedication from its members, they are displayed to their fullest effect, with wheels whirring, steam hissing and the whole far too hot to handle, all as it ideally should be. To achieve this, of course, requires a goodly supply of steam, and this is provided by a stationary boiler of significant size, a neat ring of conical rivets surrounding its base and top, a roaring coal fire concealed behind its hefty cast door, **photo 155**.

Arrayed behind the boiler, in the same neat wooden shed, with shutters open to illuminate the scene and relieve some of the heat within, a multitude of restored engines stand ready, each operable, including a hefty two-cylinder reversible beast, presumably of marine origin, mounted in its centre aisle, **photo 156**.

Yet this impressive display of industrial engineering is just one portion of the stationary steamer's domain, for outside the boiler house, an L-shaped table, raised for accessibility, is backed by a manifold ready to supply steam to any miniatures prepared to accept it. On this day in June, as on every day when the boiler is in operation, a group of these charming creations was arrayed on the table, all whirring away, each as quiet as a sewing machine bar the gentle putter of its exhaust, **photos 157**, **158** and **159**, for example.

However, while the foregoing was as captivating as always, at one o'clock a blast from the boiler-house whistle jolted us back to the present, reminding us that the time had come for the day's big event: the unveiling of the club's latest treasure, newly restored by a dedicated band of members, the culmination of an awful lot of work, I knew.

Clustering around the newest building on the site, sandwiched between the boiler house and a footbridge spanning the elevated track, the crowd listened attentively as Dick, the restoration team's leader, detailed their herculean efforts in taking a derelict mill engine, manufactured by the Atlas Engine Works of Indianapolis, once one of the largest engine makers in the US but extinct several years before the beginning of the first world war, relocating it, restoring it, and creating the delightful building in which it now stood, protected from the elements. As the applause died, Dick cracked the steam valve and away she went, her crosshead

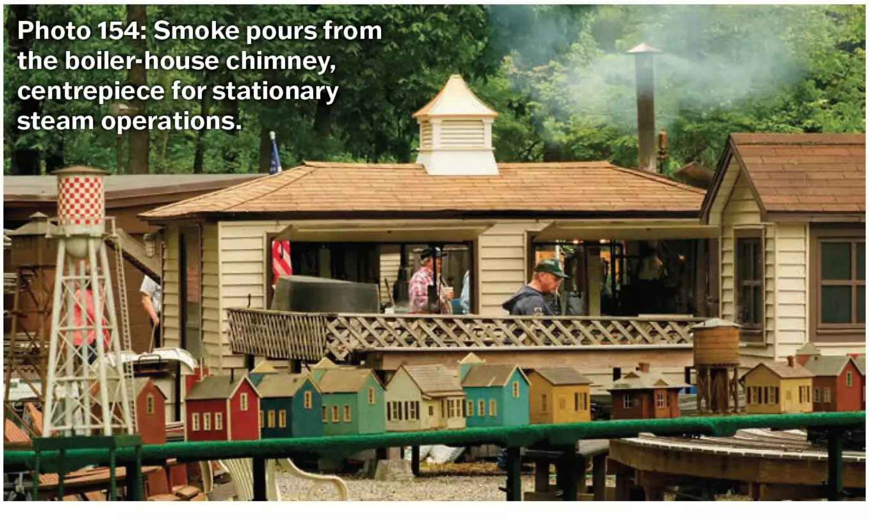


Photo 154: Smoke pours from the boiler-house chimney, centrepiece for stationary steam operations.


Photo 155: Jim attends the coal-fired boiler.

Photo 156: A selection of restored engines in the boiler house, all ready-to-run at the turn of a handwheel.

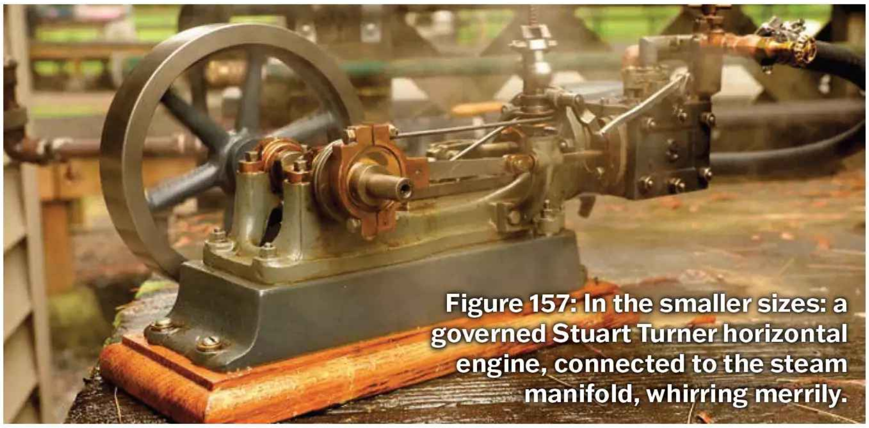


Figure 157: In the smaller sizes: a governed Stuart Turner horizontal engine, connected to the steam manifold, whirring merrily.

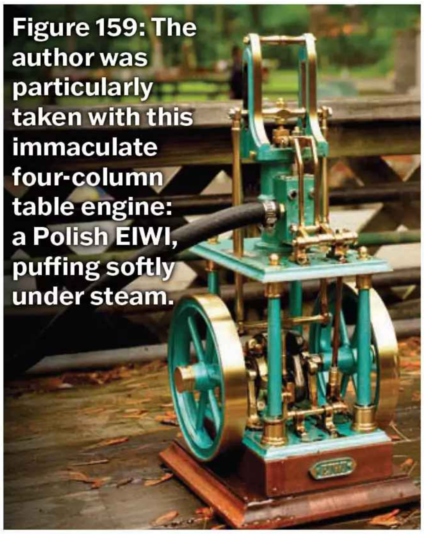


Figure 159: The author was particularly taken with this immaculate four-column table engine: a Polish EIWI, puffing softly under steam.

Figure 159: A beam engine, Stuart Turner again, hot and nodding happily.

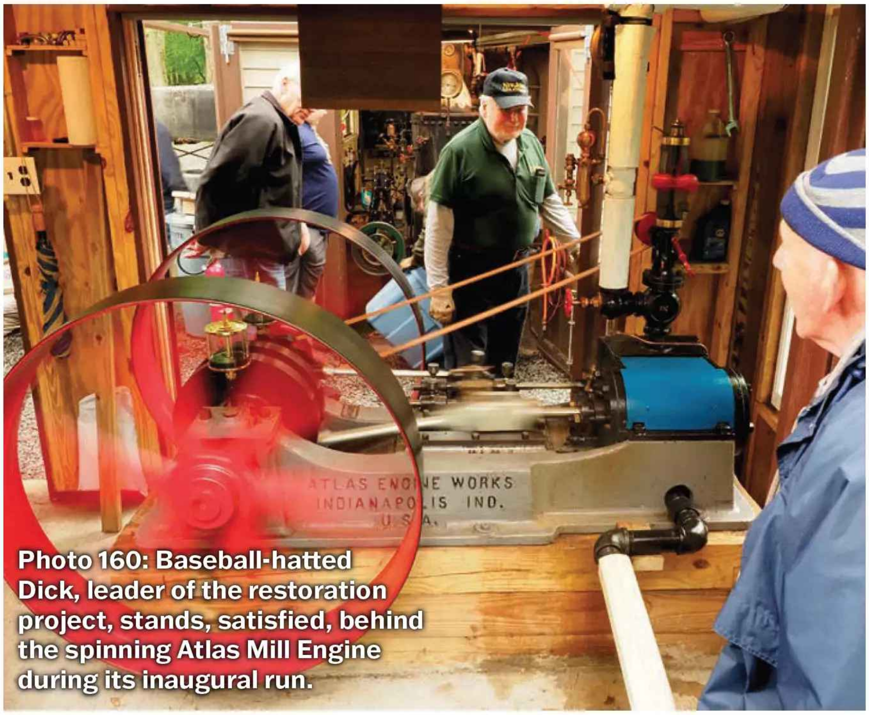


Photo 160: Baseball-hatted Dick, leader of the restoration project, stands, satisfied, behind the spinning Atlas Mill Engine during its inaugural run.

flying back-and forth; her crankshaft, set between two spoked flywheels of substantial size, spinning smoothly; her governor, belt driven, maintaining the whole at an appropriately steady speed. All in all, a truly impressive sight and a credit to the team who worked so hard to bring this milestone to fruition (**Photo 160**).

Upon reflection…

So, there we are: on the first weekend in June, roughly forty miles west of New York City, a close-knit club, whose interests cover the gamut from table-top models to full size mill engines, from miniature beam engines to scale freight trains hauled by ride-on locomotives with a little splash of whimsy on the side, came together, united by their commonalities, to happily celebrate just one cohort's hard-won achievement: neither model nor railway in nature, but engineering to its core.

Next time, we'll visit another celebration, the very next weekend yet an ocean away, and see how the two compare.

To be continued

A GWR Pannier Tank in 3 ½ Inch Gauge

PART 21

Gerald Martyn looks at the water feed system for his 0-60 engine.

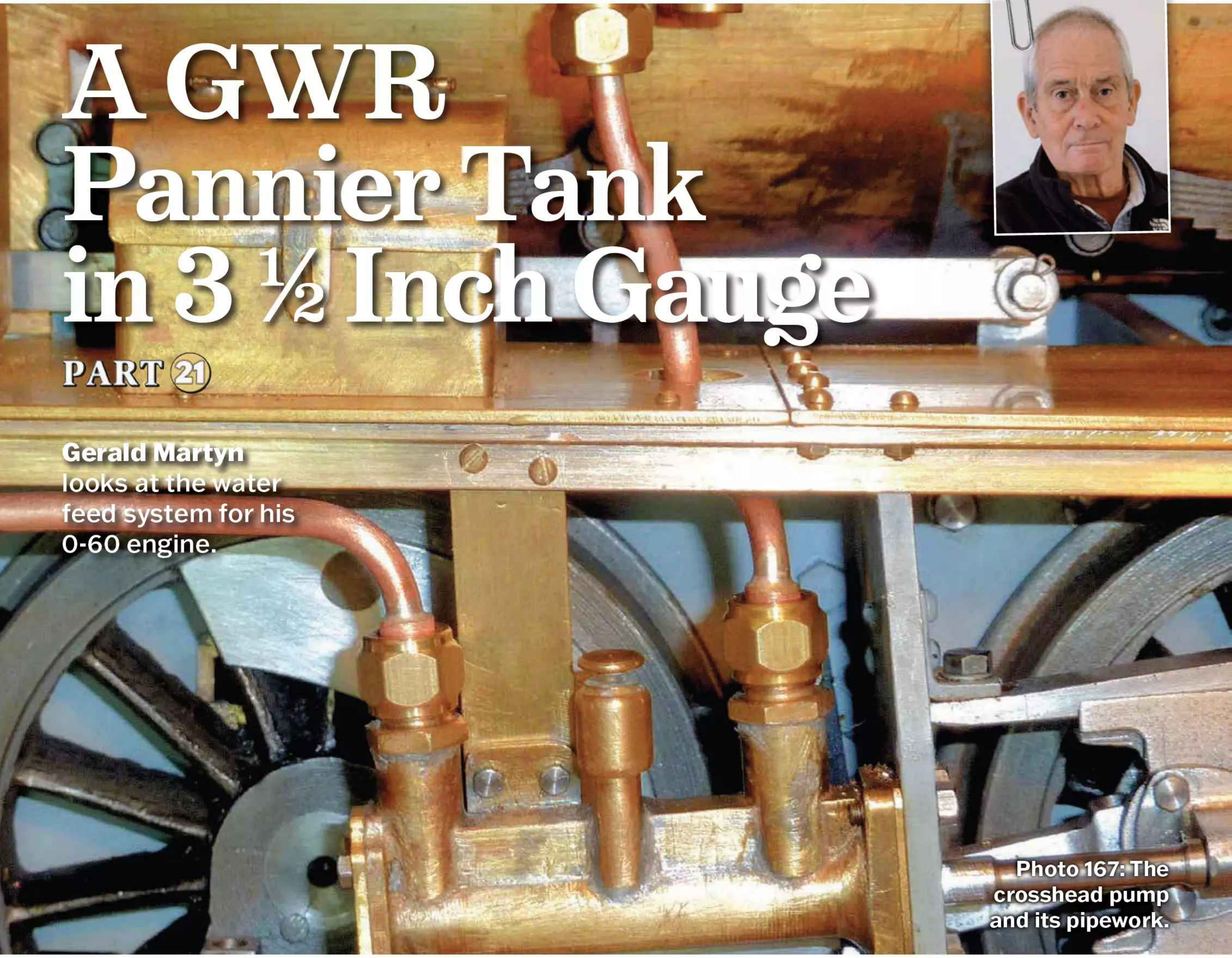


Photo 167: The crosshead pump and its pipework.

The Rob Roy water system is undoubtedly simple, provided your arms are long enough to reach forward to the bypass valve. On '1372', with water feed check valves (clacks) on the backhead, it's inevitably more complicated. To make the bending as easy as possible I've made all the pipes in 1/8" diameter copper. They have the usual nut and nipple end fittings, and my bending was all done using my simple grooved bar tools mentioned previously. The fittings are 'more of the same' in terms of manufacturing.

Figure 75 shows the schematic diagram and a view showing the pipes and fittings on the rear of the left hand tank. The pipe from crosshead pump to boiler and bypass valve runs under the running board and around the frame in front of the buffer beam into the space below the cab where it meets the Tee Connector. From here one pipe run to the right-hand clack and one to the bypass valve. **Photograph 167** shows the simple pipe feeding water to the crosshead pump and then a bit of the more complex one going rearwards under the running board to the under-cab area. Note the shortened nipple shanks. Cutting a little bit off makes more space for the bends, and

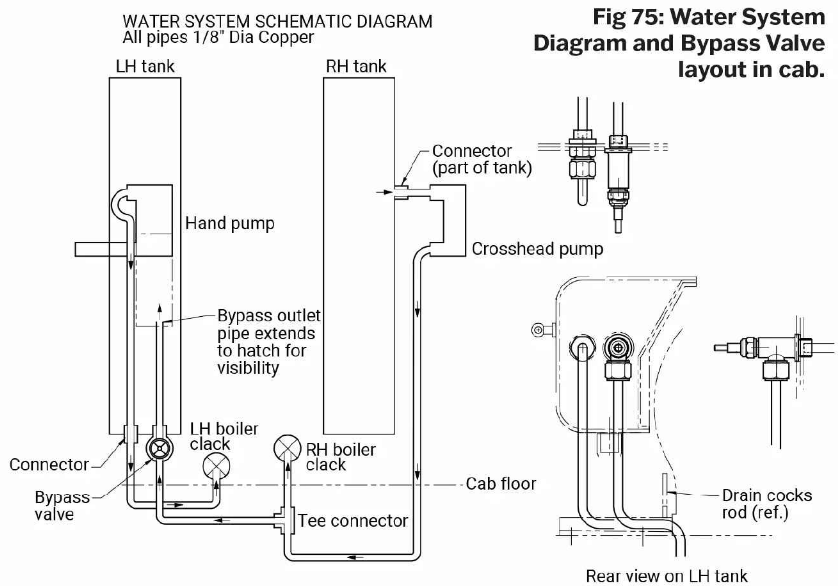


Fig 75: Water System Diagram and Bypass Valve layout in cab.

a neater job now the nuts and nipples are made fat enough to take 5/32" pipe and I did this for all of them. **Figure 76** shows all the fittings that are needed.

The hand pump water delivery pipe can be fitted through the tank hatch, just. All goes well with the bending and until the tank end connector is soldered on and then it will be found that the only way to get it in is to first wiggle it in towards the front of the tank and then drop down and rear-wards to connect up. The nut on the top of the pump is reachable, just, through the filler hole. The crosshead pump bypass outlet pipe (which must be annealed) needs to be bent up after final fitting so that it is visible just below the hatch. With the bypass open then water squiring through will show the pump is working. **Photograph 168** shows the pipework below and above the cab floor and to the boiler and left-hand tank. The Tee Connector is on the right inside the frame above the brake beam It could also be located behind the boiler, I think. It may have been better, too, if at the front lower left the hand pump pipe was forward of the bypass pipe so the two don't need to cross. The whistle will fit diagonally just below floor level and above the low level pipework, and is just supported by its pipe. Now is the time to put the cutouts into the floor panel to allow the pipes through, and it can then be veneered or not as you please, as mentioned previously. Only one parts set now remains to be made before finally bolting everything up tight; the drain cocks (if they are being fitted).

To be continued

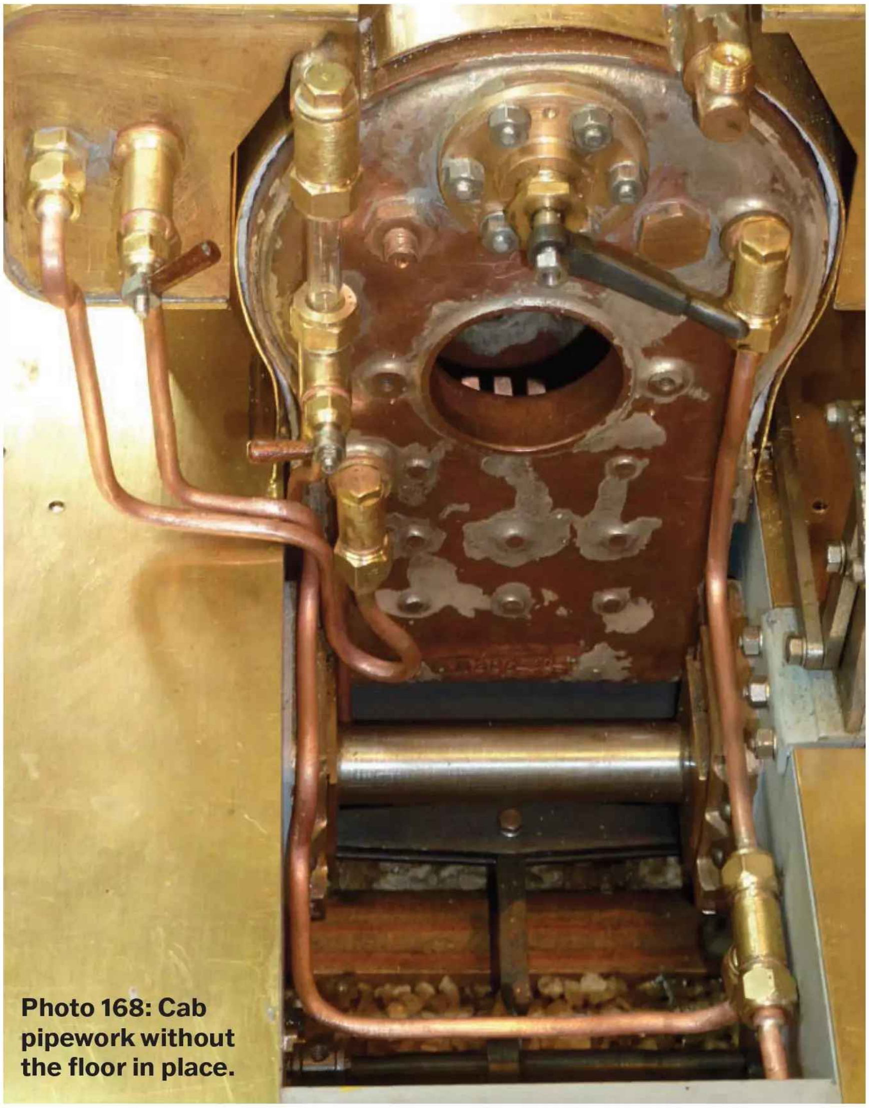


Photo 168: Cab pipework without the floor in place.

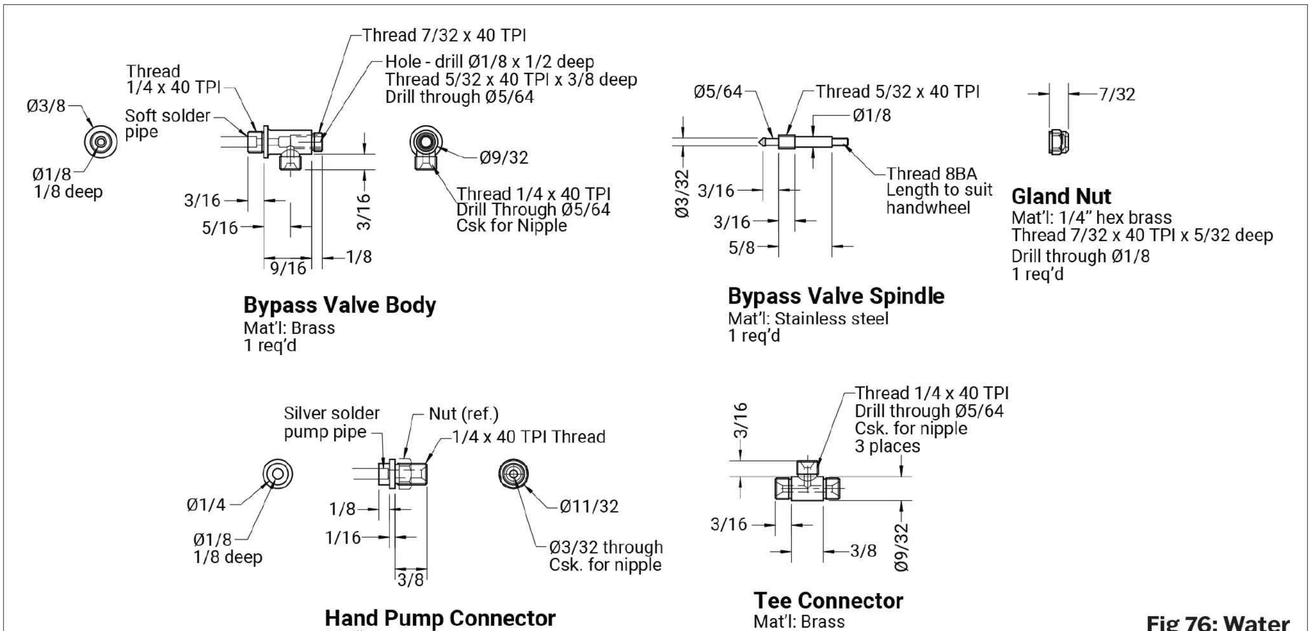


Fig 76: Water System Fittings

Photo 1: Machine taps modified for positive grip.

Holding Machine Taps

Jacques Maurel looks at various ways of holding taps, and offers designs for a some helpful accessories.

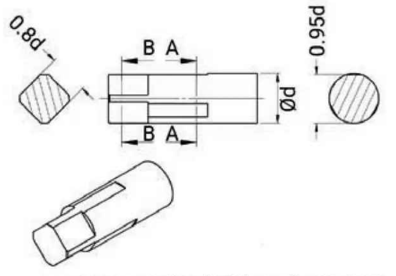
PART 1

One of the main problems when using machine taps is to hold them securely at the square end. It's possible to hold them on the cylindrical shank (with a good quality drill chuck) if the shank diameter is equal to or larger than the nominal thread (e.g. 6mm for a M6 tap). But often, second-hand long reach taps are made with a smaller shank, making it difficult to get adequate grip. I propose two solutions for holding them in a drill chuck:

Grinding three flats with a tool and cutter grinder (see **fig. 1** and **photo 1**) so a positive drive is possible with a drill chuck but still also from the square end if required.

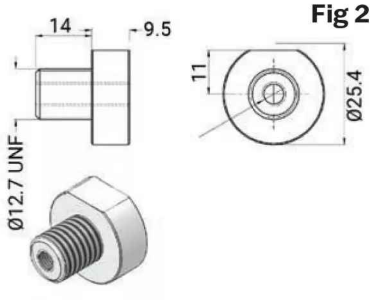
Attaching a hex sleeve (also photo 1) held with epoxy or Loctite retainer, a calculation can give the minimum length for the sleeve, but usually three times the shank diameter is sufficient. The glued joint must be well made, roughen the surface of the tap and degrease the two parts before gluing. An 8mm across flats hex can be used with a 10mm capacity chuck, 10mm AF for a 13mm chuck.

Fig 1



Square And Triangle Drive

Fig 2



Chuck Adaptor On Die Holder

Fig 3

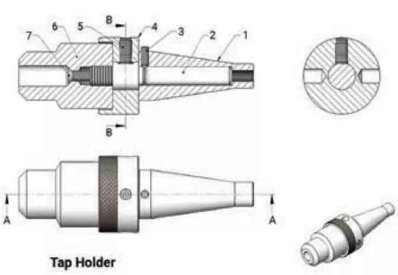


Photo 2: Chuck held using 'button' accessory.

Photo 3: Tap holder for mill.

Photo 4: MT2 version for lathe.

Ref	No.	Name	Material	Remarks
1	1	NT30 sleeve	FCMS	
2	1	Holding shaft	FCMS	
3	1	Ball locking screw		See text
4	1	Knurled sleeve	FCMS	
5	1	Screw H M8-15	8-8	
6	1	Key chuck		
7	1	Screw F/90 M6-20	8-8	

Parts list for the milling machine tap holder:

LATHE TAILSTOCK TAP HOLDER

My first idea was to use the existing tailstock die holder, the taps being held in a drill chuck via an adaptor, the rear part of which being the standard 1" button die dimension, see **fig. 2** and **photo 2**. This works but has a long protrusion out from the tailstock barrel, not a problem on the lathe but a problem on the milling machine as there is not much room vertically.

MILLING MACHINE TAP HOLDER

Hence the idea of making a dedicated short length tap holder (see **fig. 3** and **photo 3**, part numbers are

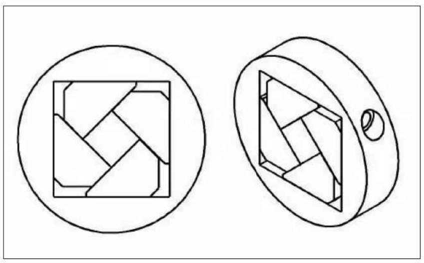
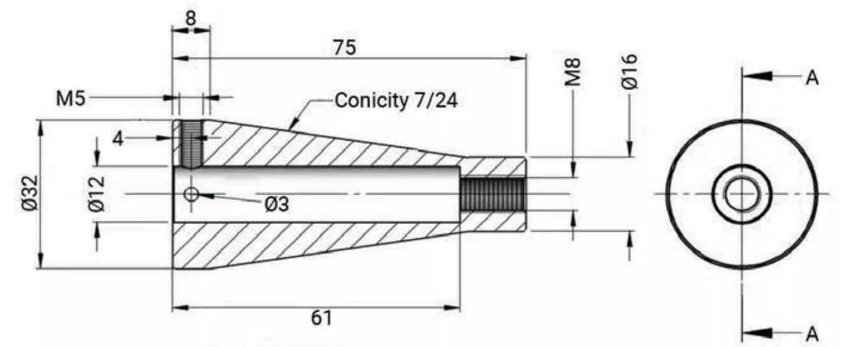


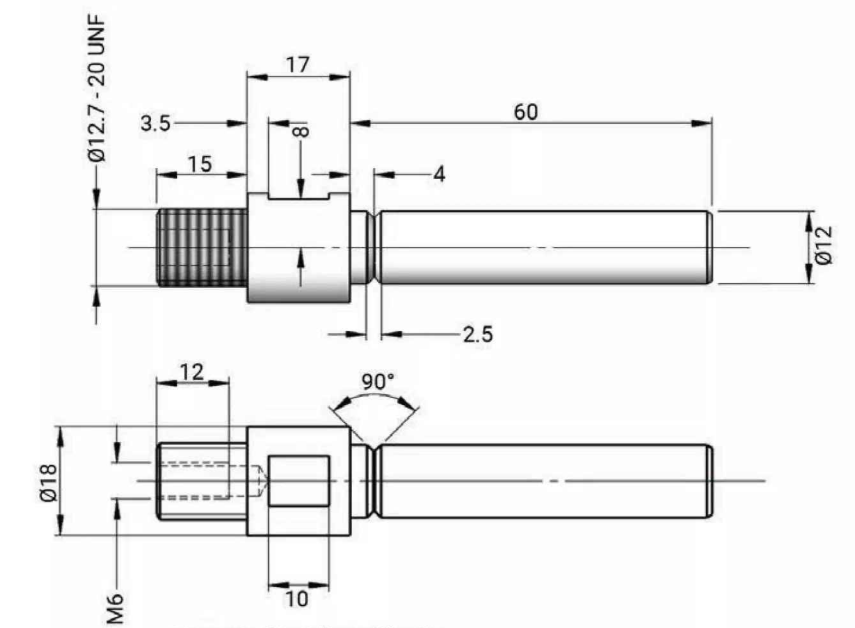
Fig 4

Photo 5: Ratchet tap holder with two jaws.

Photo 6: Ratchet spindle modified to take small chuck.



Part 1. NT30 Sleeve



Part 2. Holding Shaft

referred to in the text, only the parts you need to machine are illustrated). The drill chuck rotates in the tapping spindle, **part 2**, set in the bore of a NT30 sleeve that fits the machine spindle (or other taper to suit your milling machine spindle), **part 1**. A knurled over sleeve **part 4** can be driven by hand grip or with the help of a tommy bar to give the torque.

If you want the tapped hole to be accurately coaxial with the predrilled hole, it's necessary to tap, or at least start tapping, while the drilling spindle axis is in line with the tapping hole. If not, the threaded hole will certainly be out of alignment.

A hand operated (knurled knob) draw bar is used for a quick fit. A ball lock, part 3, is necessary here, due to the vertical position, so the tapping spindle doesn't fall out when at rest.

It's possible to use this tap holder on the lathe, **photo 4**, by using a MT2 (or as required) sleeve for guiding the tapping spindle in place of the NT30 one, the ball lock is not required.

MAKING THE MILLING MACHINE TAP HOLDER

Ball locking screw 3: This is an M5 grub screw with a spring-loaded ball at one end; there are two types available, it's necessary to use the high force one (30N) as the low force one (11N)is not sufficient to hold the tapping spindle.

Screw 7: Used to prevent the chuck from unscrewing when untapping, the right-hand helix is not a problem as the two different pitches (1mm for the screw and 1.27 for the chuck) lock one against the other when untapping.

There should be no problem for making the other parts.

Photo 7: Hex-drive tap chucks.

Photo 8: Tap wrench with four sprung jaws.

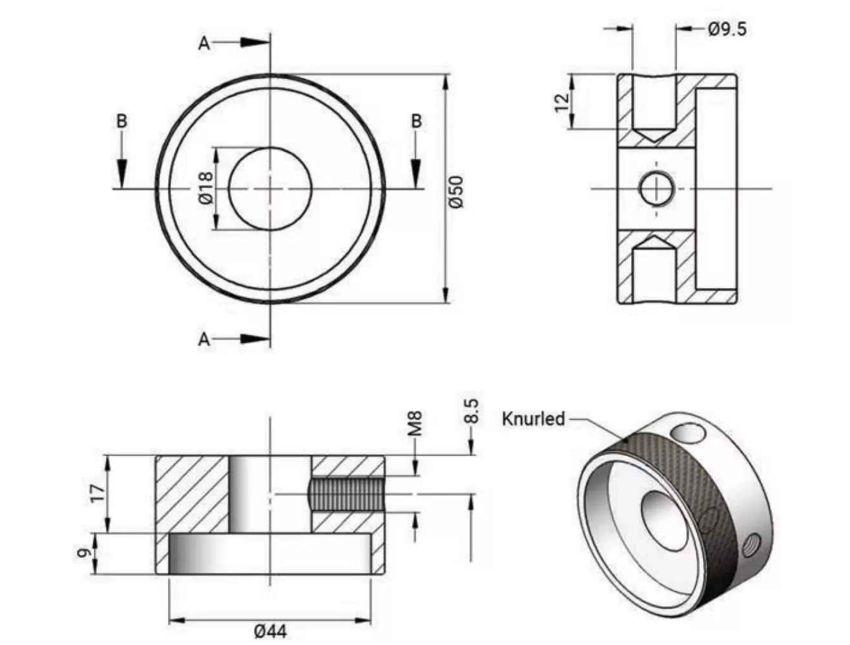
DEDICATED TAP HOLDING DEVICES

The two jaws chuck, is most often included in a Tee ratchet item, **photo 5**, there are two common sizes one for from M3 to M6 taps and one for M6 to M10 ones. I've machined my own from a low price Tee ratchet tap holder, the spindle is machined to a cylinder and a 3mm pin (1.5mm protruding out on one side) is used to drive a drill chuck as can be seen in **photo 6** showing the original spindle and the finished item. Note, it could be necessary to anneal the spindle before machining.

Nowadays two-jaw adaptors with a hex shank are commercially available but are more expensive, **photo 7**.

The four jaws spring type attachment in **photo 8** is common but the jaw's throw is too small so several are needed to cover a full range of sizes.

The 'diaphragm' type, see **fig. 4** , was fully described in *MEW* issues 231 and 232. I don't own any of these and don't know if the concentricity is good, but the outside diameter is quite big compared to the capacity.



Part 4. Knurled Sleeve

The 'two perpendicular sliders' type is most often used by tapping attachments, **photo 9**. The sliders are usually cylinders cut by half as can be seen on the photo, but I've found a more compact one with rectangular sliders, borrowed from a discarded tapping attachment. I've used it in place of a key chuck, as it is shorter in length see **photo 10**. It's not easy to make such items due to the Vee slot in the sliders, difficult to machine for an amateur unless you have a good file technique, slotting or EDM facilities.

It's often inconvenient to use these chucks as the rear slider must clamp only the square part of the tap which is not easy to see behind the front slider.

Photo 9: Two-slider holder. The rear slider grasps the square on the tap, the front one fits on the round shank.

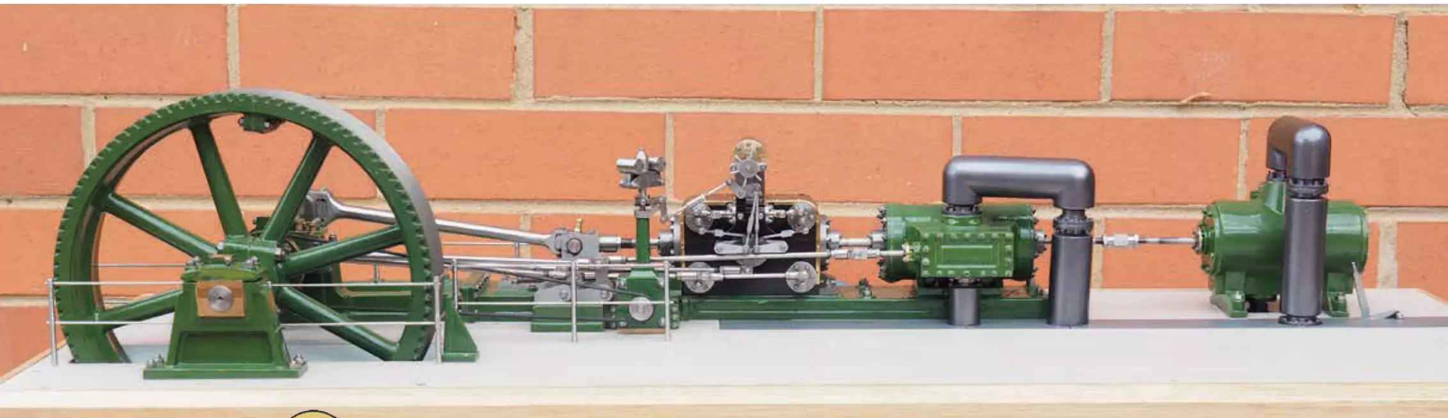
A SPECIAL TYPE

A dedicated tap holding tool that is very efficient but difficult to find is shown in **photo 11**. Two vee jaws centre the cylindrical tap stem, and two flat jaws clamp the square at the rear of the tap stem. Unfortunately the maximum diameter is only 10mm for the tap shank. So I got the idea of making a dedicated holding system for big taps, which I will detail in the second part of this article.

To be continued

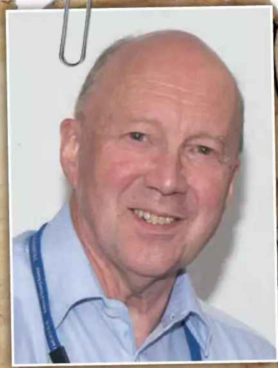
Photo 10: Short overhand of two-slider holder.

Photo 11: Special holder with opposed v-jaws for shank and two flat jaws to hold the square of the tap.



PART 24

A Tandem Compound Mill Engine



David Thomas completed the engine in our last instalment, he concludes this series with notes on adjusting and running this complex machine.

My aim for the tandem compound is to have it running well on air; steam I'll leave for others to deal with. It's possible that the engine might run when first assembled, but for me things didn't go that smoothly, tolerances always add up and even minor errors in assembly will prevent the engine running well or even running at all. Solving the problems involved many hours of detailed and sometimes very frustrating work. Some of this I could have avoided by taking a more structured approach instead of assuming that the engine could be assembled and be close enough to running to need only small tweaks. This wasn't the case, and it took me a while to understand that most adjustments interact with

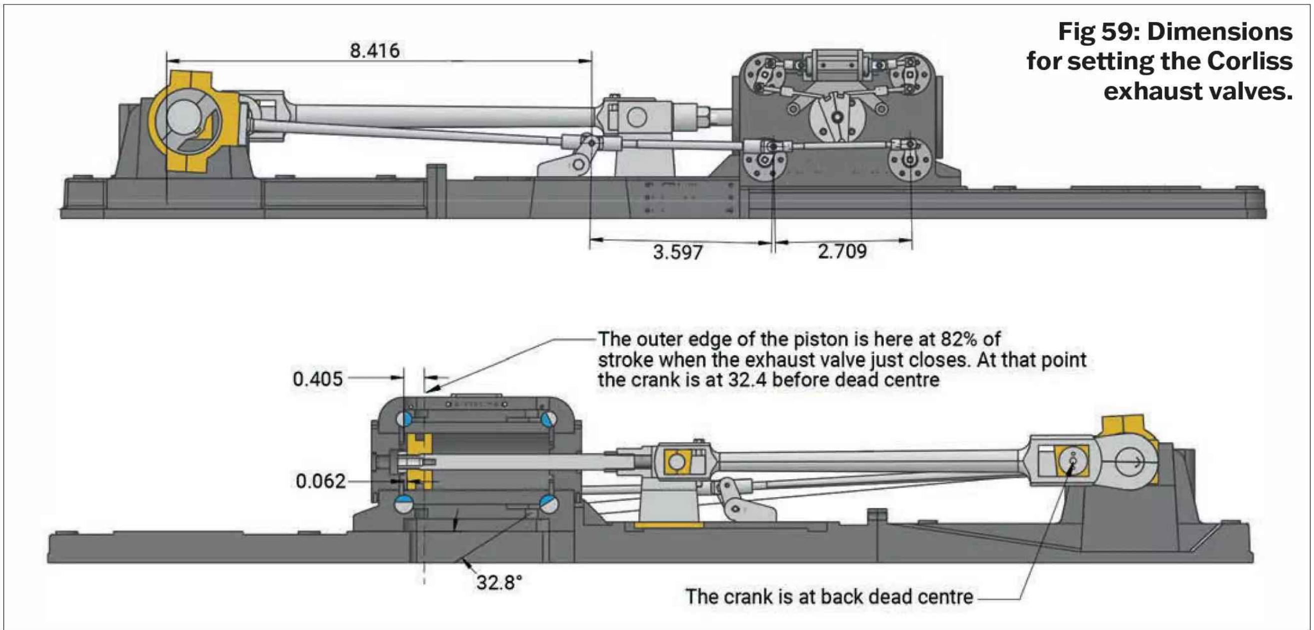


Fig 59: Dimensions for setting the Corliss exhaust valves.

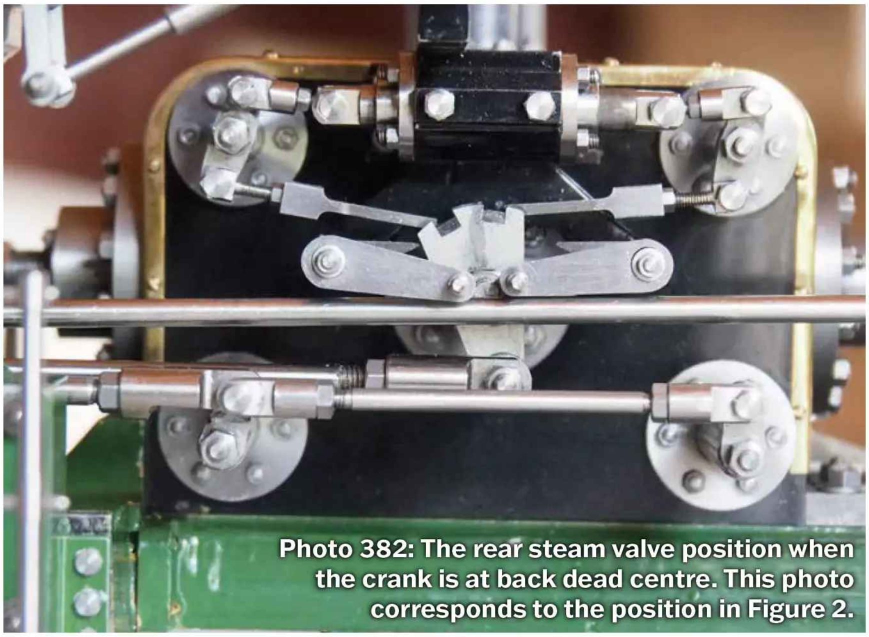


Photo 382: The rear steam valve position when the crank is at back dead centre. This photo corresponds to the position in Figure 2.

most other adjustments and that the settings are sometimes very sensitive. There is a real need to work systematically and get sections working separately before trying to make the whole engine run, so, having made all the bits and built up the engine, getting started with adjustments requires you to dismantle or disconnect a lot of it.

The air pump can be taken out of consideration simply by undoing the barrel connector on the piston rod and pushing the air pump rod right away from the crank ("backwards" as opposed to "forwards" towards the crankshaft). For the LP cylinder remove the rear cover, piston rod extension, piston and the valve chest cover. On the HP cylinder, remove the link from the governor, the trip links then the trip blades and their links to the dashpot, what's left on the HP cylinder should look like **photo 382**.

Now slacken off the locknut on the crosshead so that you can adjust the piston rod to set the pistons at the correct distance from the crankshaft. Turn the crank to the front dead centre then turn the piston rod until a piston just contacts the inside of the front cylinder cover, easily felt for by rocking the flywheel to-and-fro. Now turn the piston rod to move the piston 1/16" back from the cover which will centre both pistons in the stroke (**fig. 59** shows the piston at the back end of its stroke). Tighten the locknut onto the crosshead. Note that the locknut thickness has been reduced to 1/8" from the originally drawn 1/4".

Because the levers are set on squares on the valve shafts and those shafts have a bar and slot coupling to the valves there are a whole bunch of wrong ways to assemble these and only one correct one. The first thing to do is fix the levers to the spindles with the squares in the orientation that puts the lever at right angles to the flat on the valve (look at the rear valve and lever in the two parts of fig. 59) then assemble the valves into the cylinder with the levers and the flats on the valves pointing as in the diagram.

It might seem logical to start the adjustments of the HP cylinder valves with the steam inlets, however, setting the exhaust valves is straightforward so it's a good idea to start there. The exhaust valve events can be set by measurement and the witness milled on the outboard ends of the valves will come in handy here (**photo 383**, here a bit of colouring in with a felt-tip pen has improved the contrast). In fig. 59 the ends of the flats on the Corliss valves have been coloured blue to make them more visible in the section view. If you remove the outboard valve covers the witness marks will show you where the flat on the valve is pointing and the 8BA tapped hole in the end of the valve allows a screw to be used to extract the valve if it needs repositioning. Figure 59 also shows the necessary dimensions for the exhaust valve linkages. The length of the eccentric rod is dimensioned from the front of the crankshaft close to the eccentric which is a convenient place if using callipers. If you are

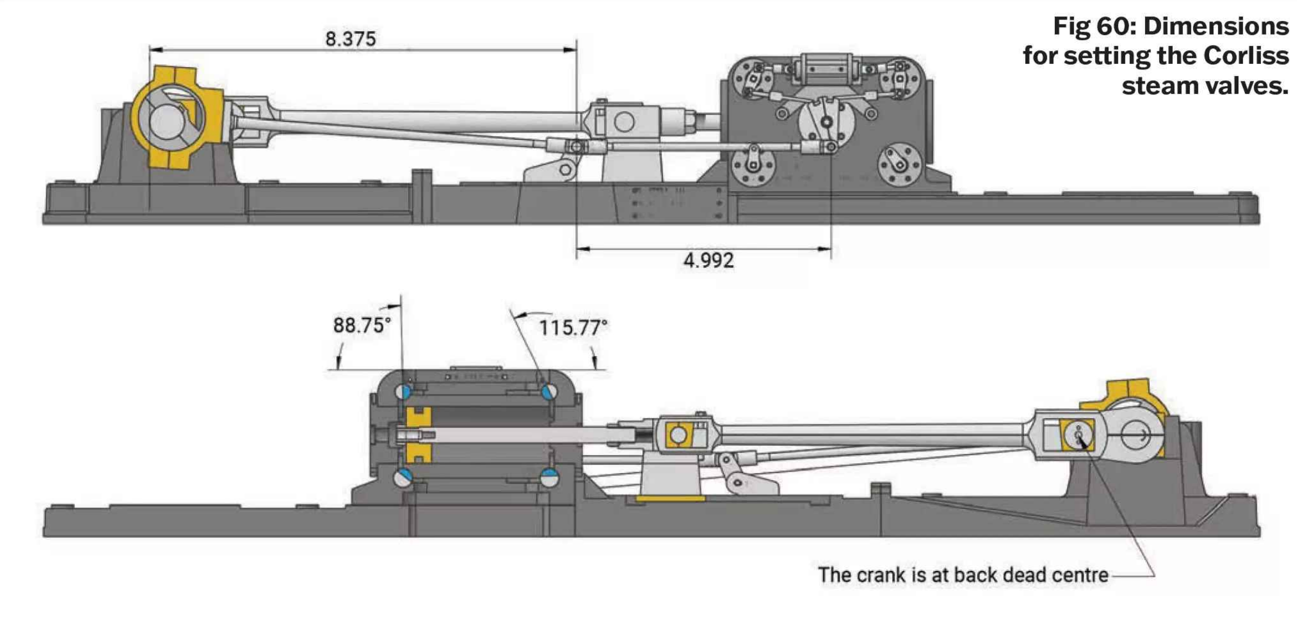


Fig 60: Dimensions for setting the Corliss steam valves.

using a rule, then an engineers' square placed against the shaft will provide a zero. The distance from the front exhaust valve lever to the back one sets the correct operation of the rear valve and is fixed but only the sum of the front two needs to be correct. This is the first place where having opposite hand threads on the ends of links becomes very useful. As noted on the section view, the exhaust valves close at 82% of stroke which provides some compression to cushion the change of direction.

As noted earlier the motion of the steam inlet Corliss valves is adjusted in two stages. The first is to get the steam lever moving correctly without the trip gear in place and then later adding the trip gear after setting the lengths off the engine. **Figure 60** shows the dimensions for the steam valve eccentric rod and the coupling rod to the steam lever that should have the lever oscillating in the correct phase with equal angular movement back and forward, note that the valves will normally trip before reaching the positions shown. **Photograph 382** shows the valve gear at this stage, the lifting links don't normally ride on the slide valve coupling rod, but they do run very close to it! As can be seen in **photo 384** the steam lever is very close to the tip of the forward trip cam when the crank is at back dead centre, this should be the same at the other extreme.

Photo 383 The steam lever position when the front steam valve is fully open

For setting up the trip gear **fig. 61** gives the dimensions to which the links should be set and the section view in fig. 60 shows how the valves are fitted to the linkages. Leave the locknuts slightly loose until after fitting the links, this allows the holes to align properly with the pivot pins. The lengths aren't too critical, but they should be symmetrical front to back. One error I made early on was to have the steam lever going too far to the rear at the same time as having the 1.313" dimension to the tip of the trip blade too short. This allowed the trip blade to drop off the top of the lever on the backward swing and then get mangled when the lever moved forward, something worth avoiding! There is yet another variable here and that is the dashpot spring which, as far as I can see, isn't specified on the original drawings. At first, I fitted one with too high a spring rate and the force required to trip the gear was high and the trip action quite violent with the trip blades flicking upwards too far. A weaker spring failed to close the valves quickly enough, so I ended up using a commercial spring with 0.85" free length, 0.25 OD, and 10 free turns of 0.019" diameter wire. This works and will have to do until I get around to making some spring winding kit, other builders could well experiment with this. At this stage the engine should run well on 50 PSI of air and may still work at 30 PSI. Listen for the exhaust beat at the LP valve chest and this should be nice and even.

The slide valve on the LP cylinder is much simpler to adjust. Set the

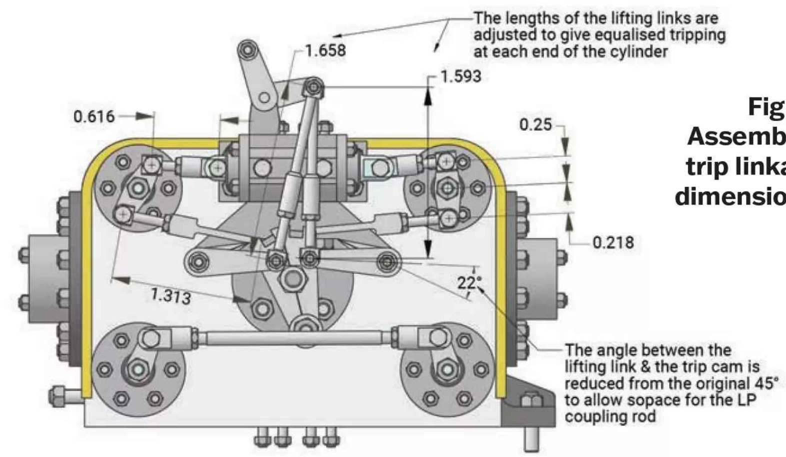


Fig 61: Assembled trip linkage dimensions.

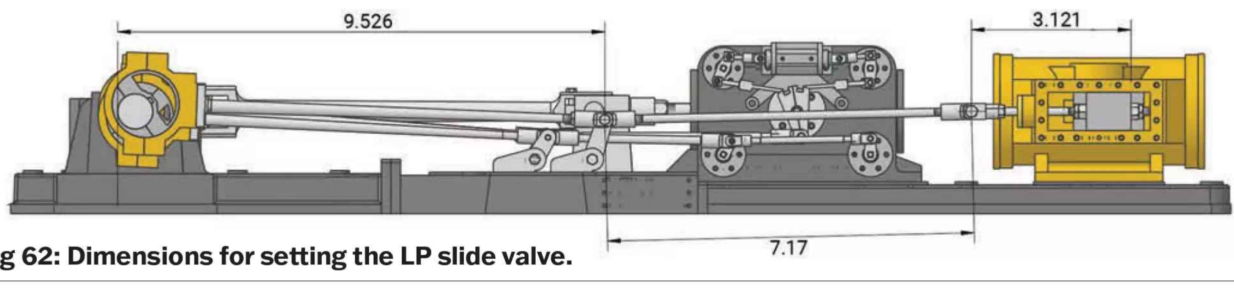


Fig 62: Dimensions for setting the LP slide valve.

rod lengths to those shown on **fig. 62**, which should get the valve timing correct, then adjust the nuts on either side of the valve to bring it to be central over the ports. The reason for removing the valve chest cover is obvious and removing the piston as done at the start prevents the possibility (in my experience, likelihood) of any compression occurring in the LP cylinder interfering with setting the HP valves. I'm not convinced that the slide valve timing is the best for running on air, but the engine runs so I've left things as drawn by Arnold Throp and Peter Southworth. Obviously, there is no benefit from the compounding when using compressed air, but I'd like to know what happens with steam.

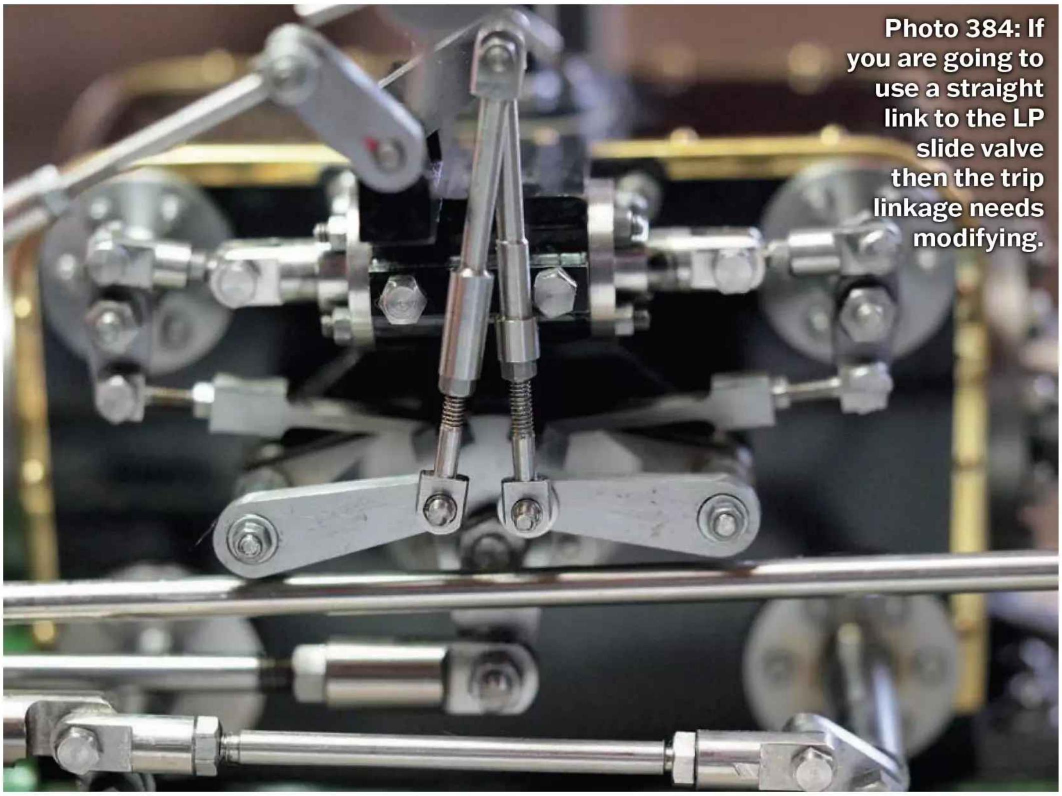


Photo 384: If you are going to use a straight link to the LP slide valve then the trip linkage needs modifying.

At this stage you can put the LP piston back in, close the cylinder and valve chest and reattach the air pump. You will now have a working engine!

The governor will give the appearance of working as drawn but needs work before it can actually control the engine speed under varying load. I haven't completely solved this, and it may not be actually possible to make a Hartnell governor in this scale functional, but I'll describe where I've got to in a future next article.

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.com.

TAPERED COLUMNS

Hi Neil, I read with interest your piece on tapered columns in the December ME&W. The Leak compound engine, featured in ME back in the early eighties also features tapered columns, with the added complication that the top end is offset from the bottom end. So the bottom end is square to the base plate, the middle section is tapered and angled, and then the top portion needs to be square to meet the cylinder block. The turning was carried out between centres. For the taper section the tailstock was offset. There is a short parallel section at each end. It may seem that this could be done next to the headstock, but there is a drive dog in the way there. So instead a centre has to be attached to the faceplate at the right radius, and the job has to be constrained by the dog so that it cannot rotate. Then the tailstock end can be turned with a short parallel section, and the end faced square, using a half centre. Reverse and repeat for the other end. Mine has a groove at each end to blend the short parallel section into the tapered section.

After that, a similar setup to the one Neil used puts flutes into the long, tapered section. The blending grooves provide a place for the flutes to run out. I was able to use a Vertex dividing head for this part, and the tailstock that came with that is adjustable for height, so it is just a matter of using a dial gauge and adjusting the angle of the dividing head and the height of the tailstock until the top is parallel with the bed of the mill.

The attached picture shows the result. The columns were nickel plated to allow a polished metal look while not corroding too quickly.

John Olsen, by email

THE ANTIPODEAN A7V TANKS

Hi Neil, Referring to Tony Reeve's Post Bag letter in ME&W issue 4678 there is a little more to the story about antipodean WW1 escapades involving captured German tanks. In fact, New Zealand troops captured two German A7V tanks near Fremicourt in August, 1918; Schnuck (Chassis 504) and Hagen (Chassis 528) and after inspection they were subsequently shipped to London and allocated to New Zealand as war trophies. There followed a furious ping-pong match of diplomatic and official communiques over how to proceed. It appears to have come down to considerations of available ships and off-loading crane capacity and all the attendant costs that soured the early enthusiasm and lead to New Zealand relinquishing these two trophies. In the meantime they languished in unsecured storage in the UK during which they were heavily 'souvenired' by the local populace that reduced them to near ruin and the only substantial artefact recovered was one of Schnuck's complete gun sponsons, currently on display in the Imperial War Museum while Hagen's hull was scrapped leaving Australia's Mephisto as the only original, intact German A7V tank anywhere in the world. It is on display at the Queensland Australian Army museum in Brisbane. The world's first armoured tank designed by a committee - two examples of which were allowed to slip through Kiwi hands while Australia sprinted off with the prize - those dratted Aussies!

Andre Rousseau, Papakura, Auckland South, New Zealand

DIVING HEAD FROM A GEARBOX

Dear Neil, some years ago in Model Engineers Workshop there was an article on a Dividing head and how to make one using 60-1 gearbox. Having a suitable box on hand, I made the plates as outlined and with the chart provided used the divider for some years.

Tasks included cutting spur gears for restoring old engines, also chain sprockets. But alas the chart has gone missing. Is there some way to replace this vital equipment?

I bought the first edition of Model Engineers Workshop and from then on for many years of enjoyment. Now my great granddaughter who is training as fitter with BHP has taken them to learn from some of the articles printed. At 93 I was pleased the magazines have been passed on.

Don, via the Website

I've been unable to track down the exact article Don references in the MEW or ME archives. The only set of tables I have are for a 90:1 ratio. Are any readers able to help Don? – Neil.

HELP WITH COMPLETING PROJECTS

My father was a dentist, but his spare time was consumed by model making. I had planned to restore his 1 ½" Allchin traction engine and his Stanley Steamcar but I have been diagnosed with Motor Neurone Disease.

If you could suggest who I might contact to enable these works to be carried out, inspiring future generations, I would be most grateful.

Name and address supplied, by email

This is clearly a task requiring a sensitive approach, I would be pleased to pass on recommendations from readers to our enquirer – Neil.

JOHN WILDING CLOCK

Dear Editor, I am trying to find constructional details for an electric clock written by John Wilding. I was told that these might have been published in Model Engineer or Model Engineers' Workshop a long time ago.

I was wondering if you might have any information about such a clock which I believe involved a large slowly rotating balance wheel.

Any information you have would be greatly appreciated.

Mike Moore, via the Website

This could be 'A 3/4 Second Pendulum Electric Clock (C.R.Jones)'. This was serialised from issue 4078, 9 October 1998. I think it's more likely to fit the description than his earlier Hipp Toggle electric clock, however, John Wilding described many clocks in Model Engineer and other publications – Neil.

JOHN BILLARD

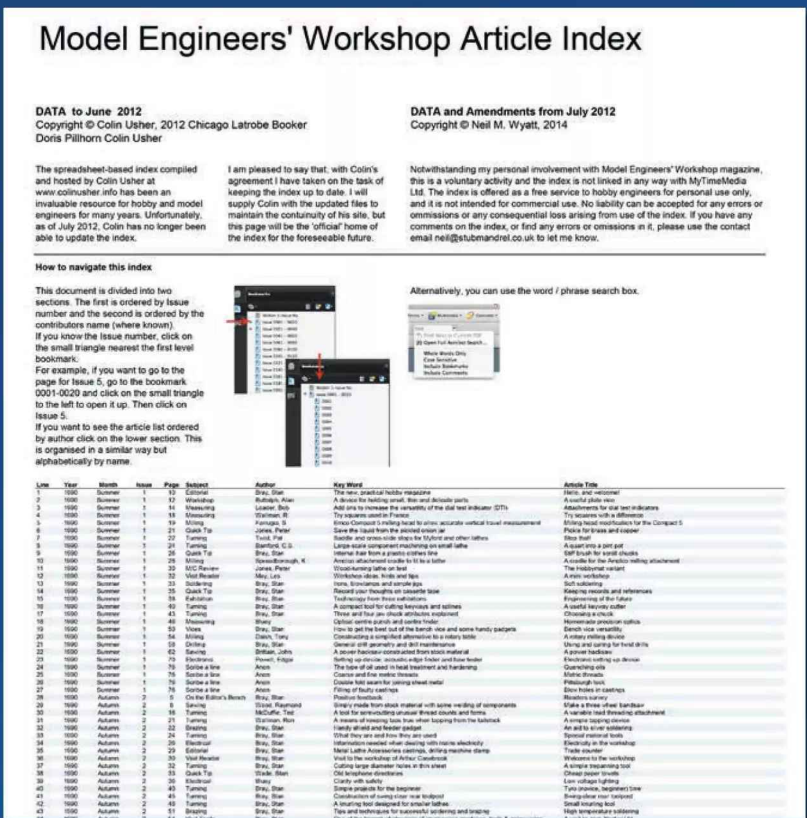
Readers will be pleased to hear that John Billard has been in touch after his accident. He's fine medically aside from his foot but is doing well although it was frustrating to be kept out of the workshop. He's confirmed that the driver did stop and exchange details after the accident, so apologies as the wording of our previous report did appear to be incorrect.

LOCOMOTIVE TRACKED DOWN

Hello Neil, Your correspondent Iona Sherwood Jones's letter (issue 4772) asks whether anyone knows what happened to her father's locomotive "Biddy". Coincidentally, I was looking at eBay just now and a Metre Maid named Biddy is for sale on eBay. Perhaps you could put her in touch: it could be this very locomotive, though I haven't contacted the seller.

Mitch Barnes, by email.

It was indeed Biddy up for auction. Although Iona was unable to purchase it she was most grateful to know it is still intact; well done Mitch! - Neil.



Model Engineers' Workshop Article Index

DATA to June 2012
Copyright © Colin Usher, 2012 Chicago Latrobe Booker
Doris Pillhorn Colin Usher

DATA and Amendments from July 2012
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The spreadsheet-based index compiled and hosted by Colin Usher at www.colinusher.info 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.

I am pleased to say that, with Colin's agreement I have taken on the task of keeping the index up to date. I will supply Colin with the updated files to maintain the continuity of his site, but this page will be the 'official' home of the index for the foreseeable future.

Notwithstanding my personal involvement with Model Engineers' Workshop magazine, this is a voluntary activity and the index is not linked in any way with MyTimeMedia Ltd. 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 ommissions 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@stubmandrel.co.uk to let me know.

How to navigate this index

This document is divided into two sections. The first is ordered by Issue number and the second is ordered by the contributors name (where known). If you know the Issue number, click on the small triangle nearest the first level bookmark.
For example, if you want to go to the page for Issue 5, go to the bookmark 0001-0020 and click on the small triangle to the left to open it up. Then click on Issue 5.
If you want to see the article list ordered by author click on the lower section. This is organised in a similar way but alphabetically by name.

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.

The solar tram.

PART 1

A Solar Powered Tram

Martin Reed decided to explore 3D printing with an unconventional project.

Ten years into my retirement I felt a need to arrest the rate of decline; I wanted to do something creative and original. True to my green credentials, it had to be something 'sustainable' – though I dread that word, I haven't yet come across a substitute, answers on a (recycled paper) postcard please.

The ROBOX 3d printer provided the answer. An additive rather than a subtractive method of modelling. I have done a little 2D Autocad but an attempt at 'teach yourself' 3D Autocad defeated me. I found the solution in an Oxford bookshop as *Sketchup For Dummies*.

This was what I was looking for.

Photo 1: Original frame.

Although the primary use of Sketchup software is in architecture, it is nevertheless a design platform that lends itself well to 3D printing and the book really gets you started (the browser-based SketchUp Free is still available to hobbyists).

What to model? Something small and relatively simple. On reading that Melbourne is planning to use solar power for its tramway network, I settled on a 'modern image' solar powered tram for my 45mm garden gauge railway. Being solar powered, the process was governed by the need to make the structure as light as possible as the solar panels themselves contribute significantly to the overall weight.

The construction was broken down into four parts:

- The Body Superstructure.
- The Solar Panel Array.
- The Powered Bogies.
- The Electrical Control System.

The body superstructure was to be the framework to which the bogies and external panels are attached directly. This structure consists of two

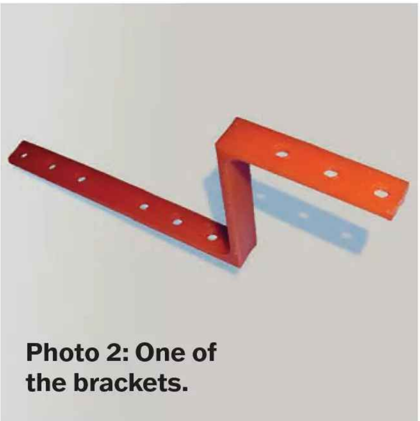


Photo 2: One of the brackets.

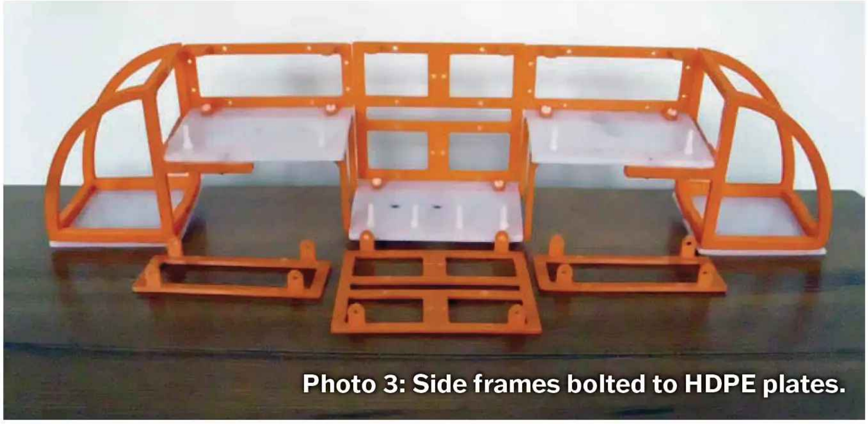


Photo 3: Side frames bolted to HDPE plates.

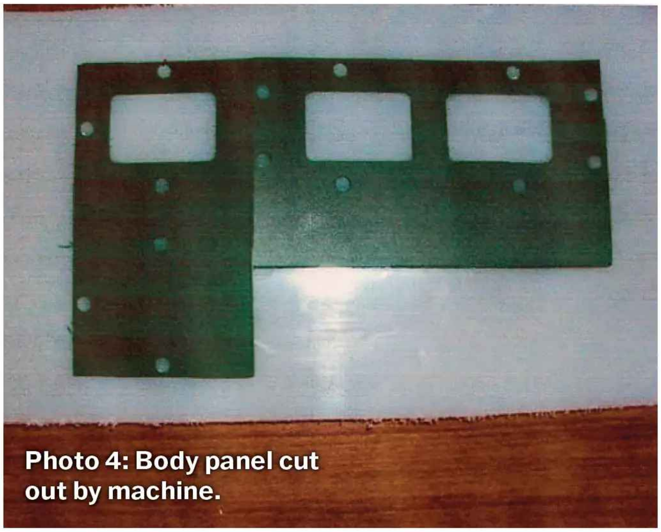


Photo 4: Body panel cut out by machine.

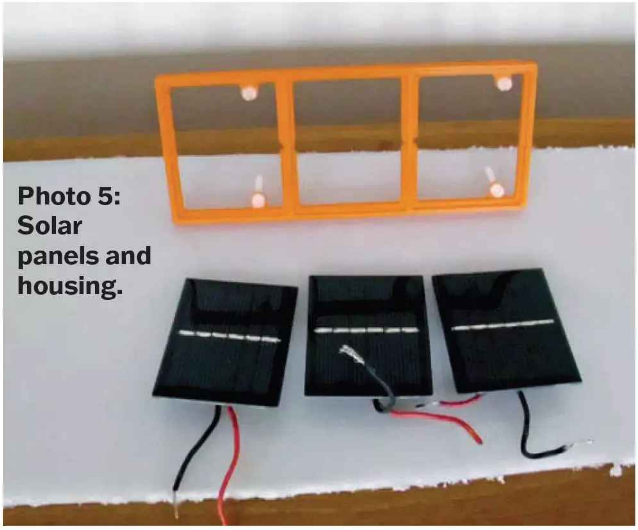


Photo 5: Solar panels and housing.

end cabs and three identical planar base plates cut from 3mm HD polythene sheet, one central to house the electrics and the other two raised up for attaching the bogies to. A single roof section cut from 3mm HDPE would accommodate the solar panel Array.

The base plates and the roof section were drilled to accommodate the 3mm nylon bolts used throughout. I have had some exchanges with engineering purists who insist on making a distinction between bolts and screws. As far as I'm concerned if the thing is threaded to accept a nut, it's a bolt. An' I'll fight any man that says different! (I await readers' letters – Ed.)

The cab sections were assembled from two 3D printed profiled halves cemented together and then in turn cemented to a HDPE plate at the base, **photo 1**.

The actual cabs used were later modified from the ones illustrated; though the profile is the same they were indeed completely resigned as originally, they were less than ideal.

It is possible to print out each cab in its entirety but as you can see, whichever way up the orientation, there will be overhangs and these need to be supported by additional material, which has the effect of considerably lengthening the time to completion.

The HDPE base plates are connected together by means of four half - U-shaped brackets (I would of course have preferred to not to halve the brackets them but unfortunately the printer bed area limits the print size, **photo 2**.

The printed body frames onto which the body panels fit include lugs to attach to the base plates and roof, top and bottom and are drilled and tapped for attachment of the body panels.

Photograph 3 shows the structure with half the side frames fitted; note holes drilled and tapped. I could have saved myself the trouble of that if I had included hexagonal slots in the panel into which 3mm nuts would glue. Hindsight is a wonderful thing!

Photograph 4 illustrates one of the body panels used to clad the outside of the frame. The holes accept bolts to attach to the frame as described. The Brother CM 300 I possess is a device for scanning and cutting profiles in card and fabric and it will, just, cut 0.5mm plastic sheet available from Kitronic. The design was created in 2D Autocad and printed out for scanning.

At this point my attention turned to the solar array, which will sit on top of the tram roof. There are two housings, each accommodating three solar panels wired in series. The solar panels are the commonplace type, available widely online. Each operates at approximately 3V and can supply a current of 30mA upwards. The printed housings are tailored to the fit the solar panels and include captive bolts for attachment to the tram roof when wired up **photo 5**.

Experiments demonstrated that the solar array could provide an output of 9.8v down to around 200x10² lux. In other words, at reasonable light levels, sufficient power was available with half the panels occluded. More of the electrical side of things later on.

With the Solar Panels wired up and cemented into place in the holders, which were then bolted onto the roof plate, trial assembly of the body superstructure could be undertaken.

Photo 6: Solar panels fitted to frame.

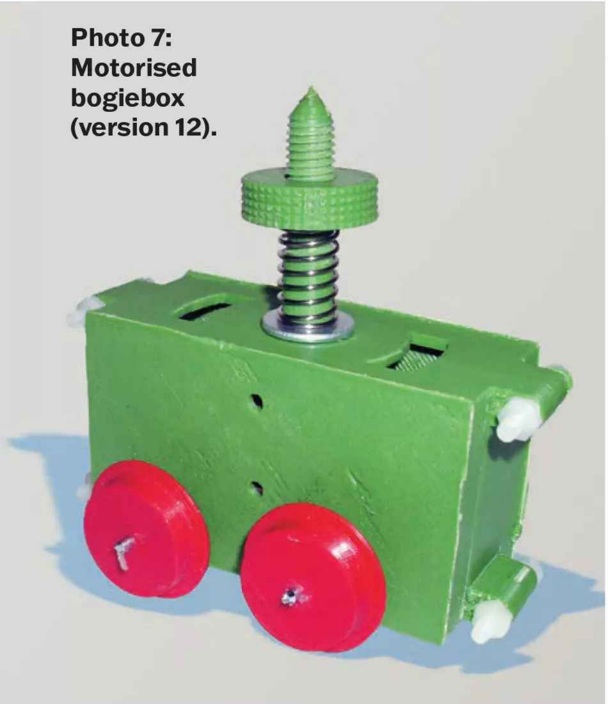


Photo 7: Motorised bogiebox (version 12).

It seemed the best method was to attach the frames to the roof assembly first then attach this structure to the lower base plates. At this point all seemed to be well, **photo 6**.

The bogie design was the activity begun first and my design took a great deal of development. Various revisions culminated in the design shown in **photo 7**. Each bogie will have one driven axle, the other trailing. The resemblance to a Fisher-Price toy is purely coincidental!

Initially the wheels were to have been of metal mounted on a 3 mm shaft, but weight constraints led to a reappraisal. In similar vein I originally passed the axles through bearings pressed into the bogiebox sides, but I found that if precisely located, plain holes did not appear to increase frictional loading on the motor, so the bearings were dispensed with. How the holes will wear, may lead to a reversal of this policy.

Bogie V1 weighed 120g. The weight of the most recent revision, V12 is 59g.

It is an interesting feature of 3D printing that the density of the printed item and the consequential strength is a variable at the user's control. In the case of the bogie boxes the print will be of maximum density for the reason outlined. Many of the body parts can be made of a much lower density, however, where lightness, rather than mechanical strength is the primary concern.

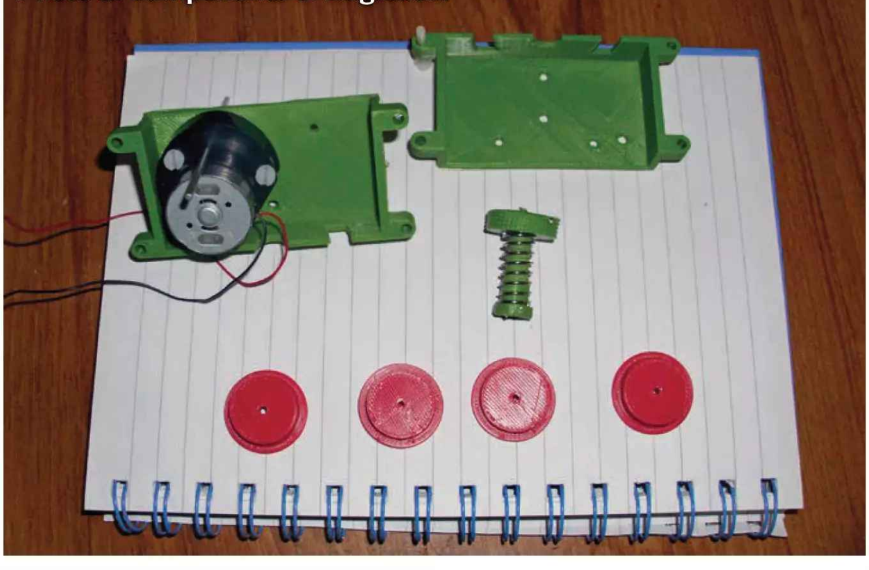
ABS printed wheels were found to be a satisfactory substitute for the metal ones. The wheels were attached to the 2mm axles by friction. I have made some 'pushers' for this exercise. Attachment to the baseplate is by way of a customised 8mm spring bolt.

Photograph 8 shows the component parts with the motor and gearbox attached to one half of the bogiebox. The main constraint when designing the bogieboxes was the height necessary to contain the motor, and this has led to a somewhat inelegant structure. Style has never been my strongpoint I am afraid, I was still wearing winkle pickers when all the other fellas already had chisel toes.

Currently the most appropriate drive is the M7K motor supplied by Component Shop. Operating down to 2V, the motor can supply sufficient torque through a 1:9 integral gearbox. I do like the tiny coreless motors that are used to power drones but running unloaded at 10,000 RPM, some work would have to be done to design the necessary transmission and housings. If anyone can help here, I would be very grateful for advice.

To be continued

Photo 8: Components of Bogiebox.



Batteries and Cells for Workshop Projects PART 2

We conclude this brief introduction to different battery chemistries and their applications.

Photo 4: 60Ah leisure battery, used as a field supply for imaging including camera cooling.

LEAD ACID

Lead acid secondary cells are heavy and contain corrosive sulphuric acid, but in balance they have high capacity and can deliver high current for sustained periods of time. The nominal voltage per cell is 2v and we usually encounter 12V six-cell batteries.
Gel batteries are a variant construction that has the acid in the form of a gel rather than a liquid. This eliminates the risk of spilling acid associated with ordinary lead acid batteries.
A freshly charged 12V lead acid battery will have an actual voltage of 14.4v to 14.6v, equipment designed to use such battery will be tolerant of this over-voltage. Different designs of lead acid batteries balance the ability to deliver high currents against being able to cope with greater levels of discharge.

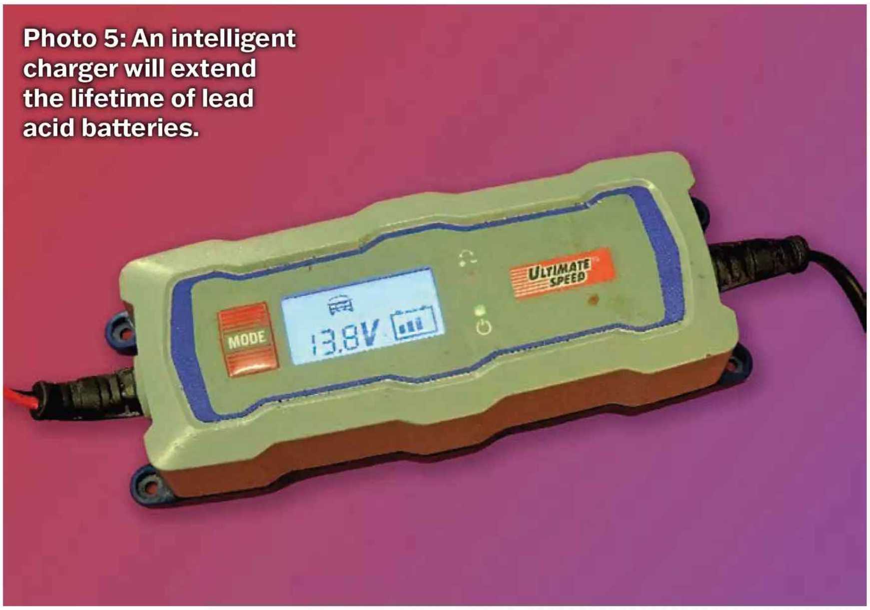


Photo 5: An intelligent charger will extend the lifetime of lead acid batteries.

Car starter batteries are notoriously easy to damage by over-discharging and therefore are a poor choice as a portable power source for electric locomotives and the like. Leisure batteries, **photo 4**, can be expected to last much longer when used in such a way, but even better lifetime for cyclical use can be delivered by 'traction' batteries intended for uses such as stairlifts and golf buggies.
For portable use, a lead acid battery works well as a source of power, but ideally it should be a leisure or deep discharge type as it's possible to get through 20-30 amp-hours of capacity in a viewing session if you have a cooled camera and dew heaters, enough to damage a standard car battery with repeated use. It's also wise to buy a quality electronic charger, **photo 5**, that will monitor and condition the battery, rather than using a basic charger. Relying on a cheap charger can greatly reduce the capacity of even a leisure battery used in this way over fifty or sixty sessions.
For relatively low-powered equipment I have found a 7Ah lead acid traction gel battery, **photo 6**, to be reliable, with one happily running my 3 ½" shunter for a few laps of a typical track, pulling me along behind. One thing to avoid are cheaper 'standby' batteries for fire and burglar alarms. These will degrade very rapidly with the levels of discharge associated with our uses.

NIMH

NiMH, nickel metal hydride, was long the usual rechargeable chemistry to replace primary cells in standard formats such as AAA and AA, as in photo 1. The previous Nicad chemistry contained toxic cadmium and is now obsolete. The voltage per cell is a fairly steady 1.2V for most of the discharge period. This can be an issue when multiple cells are used to power equipment, for example four alkaline cells give 6V, but four NiMH only give 4.8v.
Aside from this, NiMH has comparable performance to alkaline cells but tends to have a greater capacity in mAh.
NiMH benefits from the use of dedicated chargers to give the best results and long life.

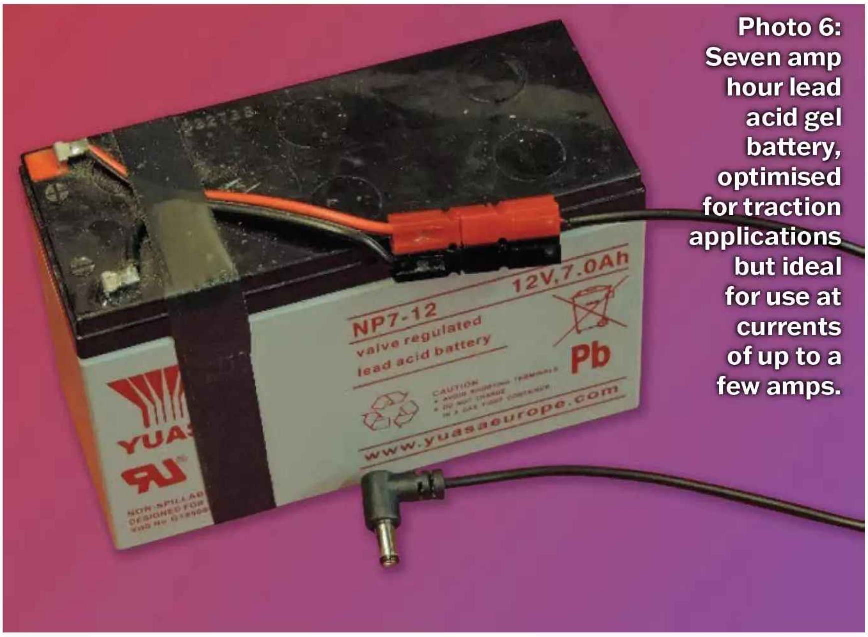


Photo 6: Seven amp hour lead acid gel battery, optimised for traction applications but ideal for use at currents of up to a few amps.


Photo 7: Lithium-ion cells are available in a host of sizes. Treated with respect they are an ideal solution for much portable equipment.

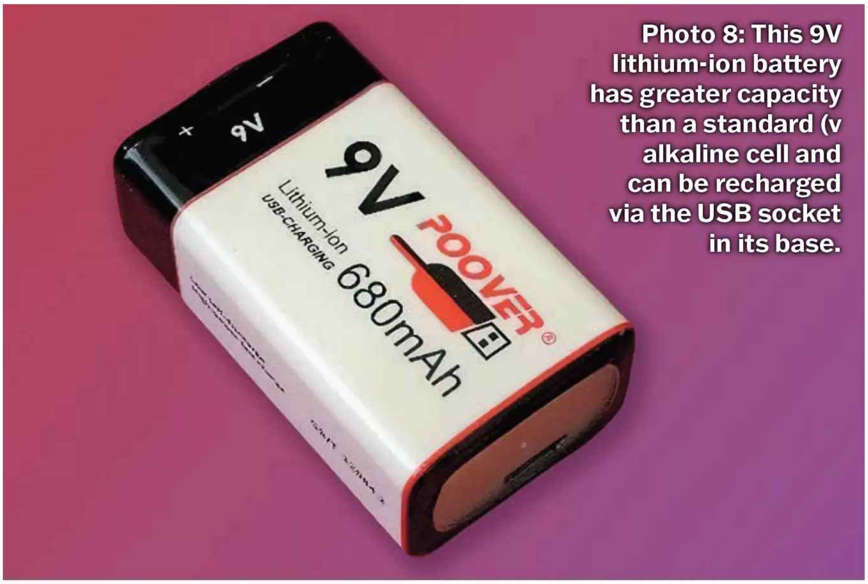


Photo 8: This 9V lithium-ion battery has greater capacity than a standard (v alkaline cell and can be recharged via the USB socket in its base.

A downside is that they discharge 'on the shelf' much faster than alkaline, although some new chemistries are much improved in this respect, holding most of their charge for up to a year.
It is also worth seeking out these low self-discharge brands as they are much more reliable when your equipment has been left unused waiting for clear nights!

LI-ION

Lithium-ion cells are rechargeable with both high capacity and the ability to deliver high currents, yet with a low self-discharge rate and relatively low weight, **photo 7**. They are now ubiquitous in equipment such as mobile phones, laptop computers and portable tools, often having dedicated chargers. They are common in much portable gear, especially hand tools and DSLR cameras.
Variations in the exact construction and chemistry mean the voltage can vary from 3.6 to3.8 volts. They can be damaged by over charging or short circuiting, with the risk of fire, and they can also catch fire if physically damaged. If over-discharged they can be damaged so some include a small circuit to prevent this happening which means they will 'cut off' suddenly when the voltage is low. Some chargers are able to recover Li-ion cells from an over-discharged state by applying a very small trickle charge until they reach a safe voltage.
A relatively new development are 9V rechargeable lithium batteries in a PP3 form factor. Typically, 680mAh these actually hold more charge than an alkaline PP3 (300-500mAh) and perform well at low temperatures. What is particularly useful about these batteries is that many have a micro-USB socket in the base and an internal charge circuit, allowing them to be charged from a high-current USB socket, **photo 8**. Unfortunately, lower quality examples may have a particularly noisy output unsuitable for some applications.

USING LI-ION CELLS IN PROJECTS

Li-ion cells can be bought individually and are often readily available to hobbyists from equipment that has reached the end of its working life such as old mobile phones, **photo 9**. These need to be treated with care to avoid the danger of overheating and fire. Never attempt to re-use or charge any Li-ion cell with signs of damage, such as 'bulging' due to gas build up, photo 10**. There are now various ICs and modules available that can provide controlled charging of Li-ion cells.

If you want to use multi-cell lithium packs then a special balance charger that ensures all the cells are charged equally is required. That in **photo 11** is also usable for several other cell chemistries as well as having several other functions such as testing and repeatedly cycling NiMH cells to recover lost capacity.

Photograph 12 shows a Li-ion charger module based around a TP4056 integrated circuit (IC). This chip can charge single Li-ion cells from a USB connection or a DC supply of 5-8v. It automatically manages the whole charging process, normally supplying a current limited charge (the modules are set for this to be 1 amp) until the battery voltage reaches 4.0V, when it changes to a constant voltage charge until the battery is full (the charge current drops to 10% of the maximum charging current). When charging power is removed it drops into a 'standby' mode consuming less than 2uA so it can be left permanently connected to the battery.

The chip supplies a small trickle charge current if the battery voltage has dropped unusually low (below about 3V) which can allow it to recover some over-discharged cells without damaging them.

The modules include indicator LEDs to show when the module is charging and when charging is complete. They come pre-programmed for a maximum current of 1000mA, if you are charging very small cells you may need to set a lower current by changing the current programming resistor. Details can be found on the

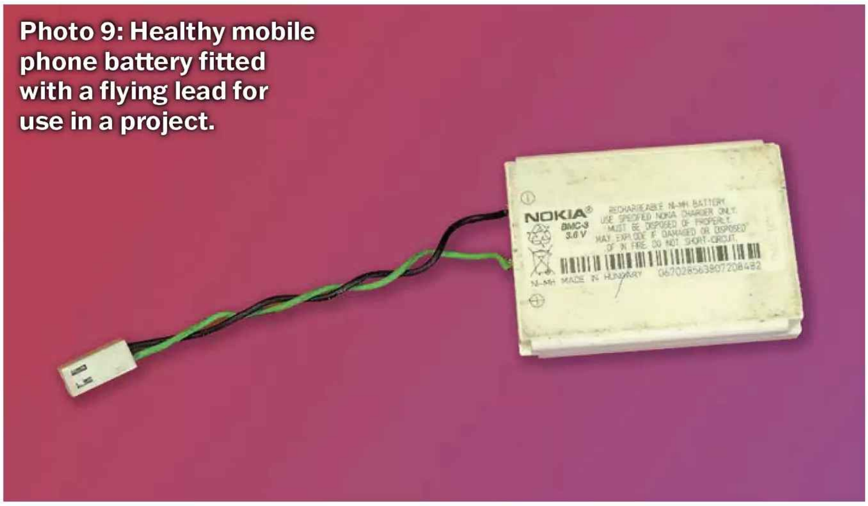


Photo 9: Healthy mobile phone battery fitted with a flying lead for use in a project.

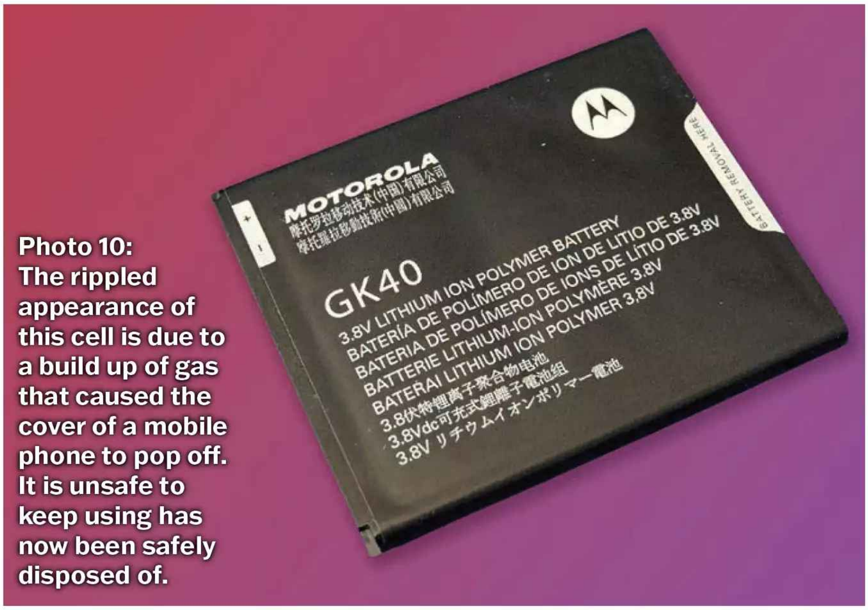


Photo 10: The rippled appearance of this cell is due to a build up of gas that caused the cover of a mobile phone to pop off. It is unsafe to keep using has now been safely disposed of.

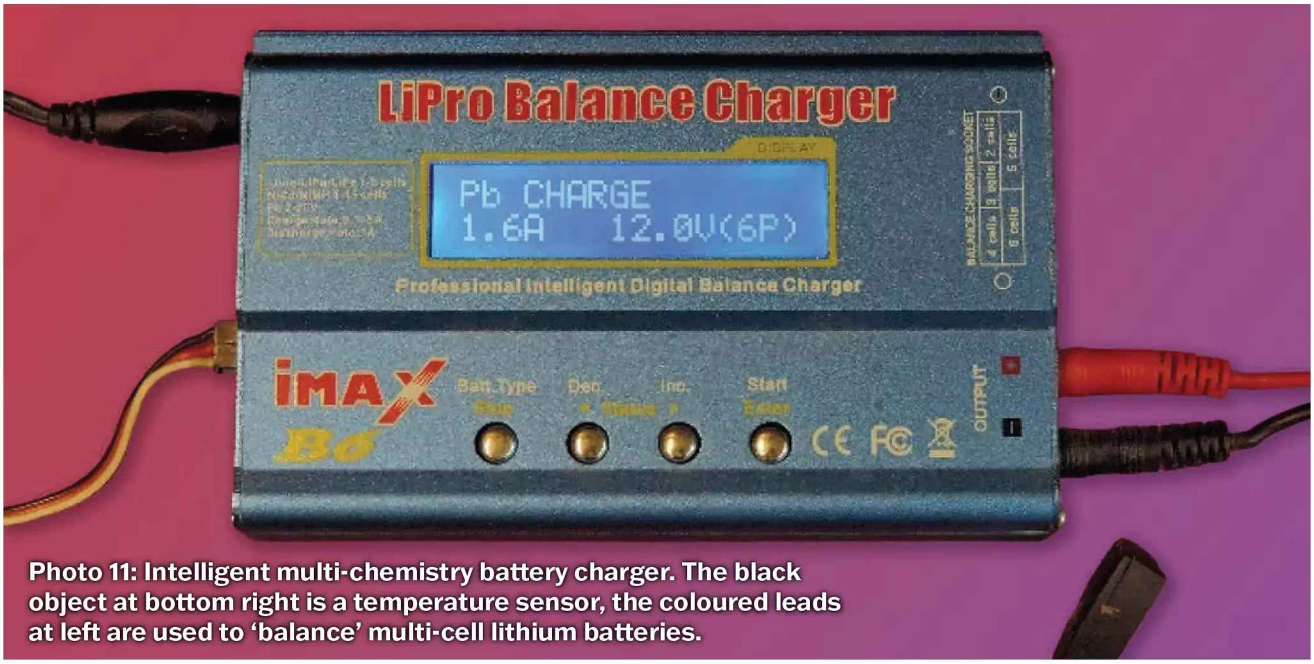


Photo 11: Intelligent multi-chemistry battery charger. The black object at bottom right is a temperature sensor, the coloured leads at left are used to 'balance' multi-cell lithium batteries.

TP4056 datasheet which is easily available online. Note that the modules do not usually allow for you to use any internal thermistor on the cell to monitor temperature. If you wish to make use of this functionality, refer to the datasheet.

One issues with using Li-ion batteries with many projects is that because they only produce rather less than 4V they are unsuitable for many applications that require a full 5V to work properly.

The simple solution to this is a voltage booster module, such as that in **photo 13**. This example, is based around an MT3608 chip and can deliver up to 28V from a 2V input. The connections are simple, the cell should be connected across Vin+ and Vin via a switch, usually in the positive line. Before connecting the output, its voltage must be adjusted using the multi-turn potentiometer.

Wiring the modules is simple, **fig. 1**; just connect the positive and negative leads from the cell to the BAT+ and BAT- connections on the board. You can supply power via the USB socket (which does not have any signal function) or supply up to 8V across the IN+ and IN- connections. It's important to bear in mind that these modules are NOT suitable for use with a 12v supply!

The maximum output current is 2A but in practice this is optimistic, especially if the step up ratio is large as the input current is larger in proportion to the voltage stepup, plus an amount to allow for inefficiencies in the circuit.

For example, running a stepper motor at 12V and 1 Amp via one of these modules could require up to 4 amps from a single Li-ion cell and is over-optimistic. On the other hand, the small geared 28BYJ-48 stepper motor, only requires about 260mA maximum at 9V, which would draw less than an amp from the cell, an if the load is only required for brief periods a boost module could be a viable alternative to using a PP3 battery for such purposes. In my case, the setup was used to power a 9V miniature digital oscilloscope from a single Lion cell.

LIFEPO

Lithium-iron-phosphate batteries are more robust than Li-ion cells and less likely to catch fire if they are damaged or mistreated. They are relatively cheap to manufacture and because they can keep their capacity over many charge/discharge cycles they have become popular for electric vehicles. Their voltage of 3.2v means that using four together can mimic a 12v lead acid battery so they have become popular for portable 'power packs', although the cost of these is often much higher than equivalent pack with lead-acid gel batteries.

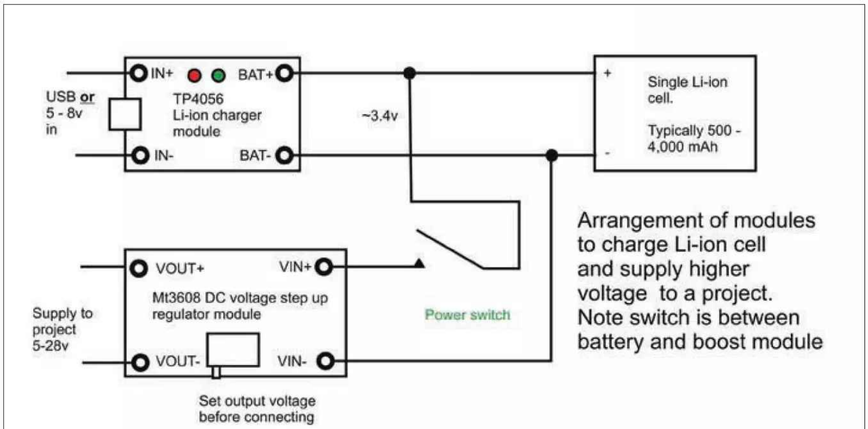


Fig 1

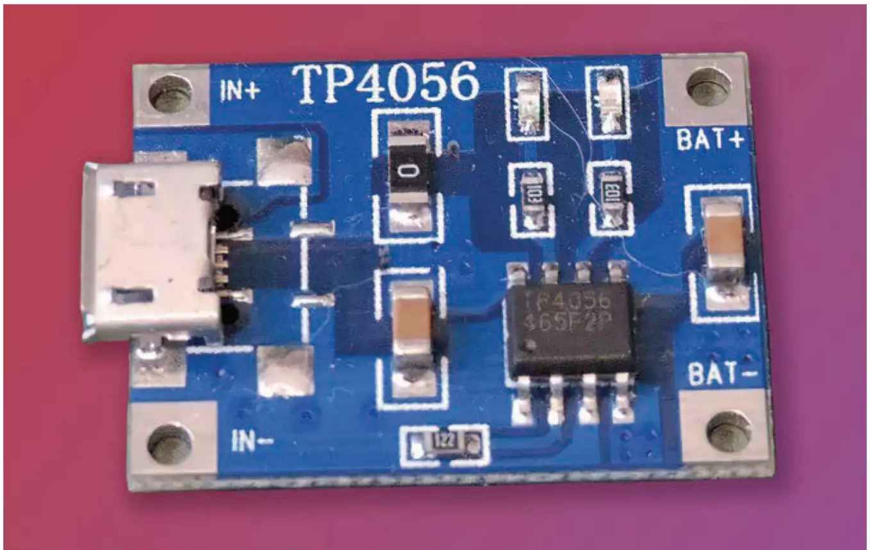


Photo 12: Single cell lithium-ion charging module built around a TP4056 chip.

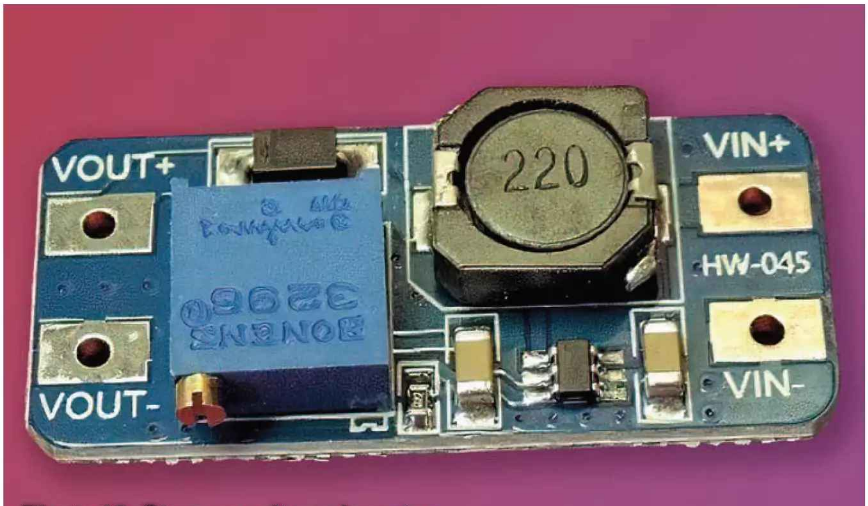


Photo 13: Step up voltage booster, the brass screw on the multi-turn potentiometer adjusts the regulated output voltage.

Lowmex 2025

Julie Williams gives an 9in-depth report on this now established show in the east of England.

Photo 1: Locomotion and Rocket.

Photo 2: Newcomen engine.

Lowmex is a regional model exhibition, which can easily hold its own with the Nationals, and which has just celebrated its tenth anniversary. The venue is the East Coast College in Lowestoft and the ethos is that it is a model exhibition that has a small handful of chosen trade stands. The Lowmex committee is a subsidiary of Halesworth and District Model Engineering Society (HDMES) and they are the heart of the exhibition, with other invited model groups in the area also showcasing their models and skills. The hardest part here is choosing which models from the 420 crammed tables, the many free-standing exhibits and floor layouts along with the very mobile (and noisy) models to write about. But, in this anniversary year, we really should start with *Locomotion* and *Rocket*, representing the catalyst and the innovative steam tech changes that became the template for all following locos, and the subsequent spin offs. Kevin Rackham has *Locomotion* as a work in progress, along with other projects, and the *Rocket* on display belonged to his wife, one of many models from her collection, **photo 1**.

Photo 3: 16mm scale railway models.

Exhibiter John Child is fascinated by the older steam engines, the ones that preceded the use of pressurised steam as we know it. In **photo 2** you can see the ‘other side’ of his working Newcomen Atmospheric Engine, made from scrap, household items. On the right of the photo is John’s model of a Stirling-cycle hot-air engine and to the left of the photo is his model of a vacuum motor, known as a flame-licker, flame eater or atmospheric engine, designed by Henry Wood.

Most people think of locos when you mention steam – and they were there in all scales, gauges, types and materials. There was an intricately detailed N gauge layout by Dave Ransome. Andy Belcher, Chris Nobbs and Liam Hines displayed some of their 16mm scale layout with a very detailed WWI layout, a Darjeeling and Himalayan railway and Penrhyn quarry models, **photo 3**, along with Chris’s Garrett loco as a work in progress **photo 4**. The 16mm Association had their 32mm layout running live steam, and others ran G1models. All of these layouts created lots of interest with the public, especially with the youngsters.

Chris Rackham displayed an 0 gauge

Photo 4: Work in progress, an NGG11 Garratt.

Photo 5: 3 ½” gauge railway models.

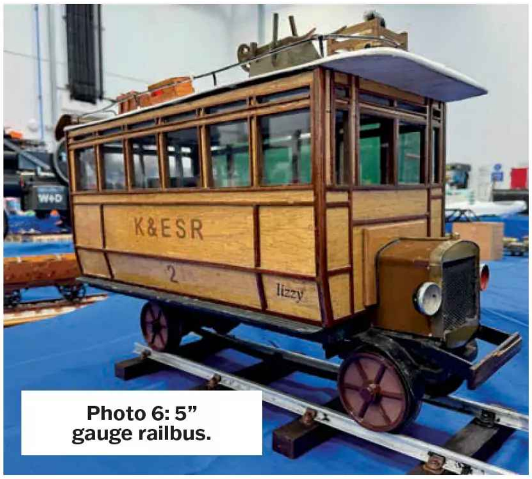


Photo 6: 5” gauge railbus.

Photo 7: Ride on Lowestoft Tram.

Flying Scotsman; brothers Neal and Nigel Davis had an extensive display which included a 3½” gauge railway crane running on compressed air, **photo 5**; Dean King made everyone smile with his 5” gauge, quirky, railbus (which included Shaun the sheep and a wheelbarrow, **photo 6**); and Robert Buck displayed his 7¼” gauge, ride on, Lowestoft tram, **photo 7**.

There were lots of traction engines. From a 1” scale *Minnie* by Peter Williams to 2” Showman’s engines by Nick Gratton, **photo 8** the ‘pretty engines’ which toured the country creating electricity for fun rides. There was Gary Edward’s 3” compound road roller and father and son David and Glenn Doddington’s 4” Foster – one of two that they are building, **photo 9**.

There were also traction engines in live steam running around outside. **Photo 10** shows, from left to right, *Burler* a 4” scale Burrell owned by John Wilkins; *Magic* a 4” McLaren Road Loco owned by Clive Randlesome; and Little Samson a 4” Savage, owned by Mike Cook.

Peter Joyce, who displayed a twin cylinder Garret stationary engine, a crankless engine and various tools, also displayed his project in progress of a of a 4½” scale Foden lorry which he is building as a six-wheeler.

Gary Edwards also displayed a 1:6 scale WWI Armortek tank, **photo 11** which is a model of the ‘bank’ tank 142 which was stationed on Brighton seafront, and other places, and used to sell War Bonds; and, keeping with that theme, Matt and Judith Fidler, with R/C units, guided their British Comet and German Tiger Tanks round the exhibition site, **photo 12**.

Other things that were running around were the Norwich Droids, **photo 13**, along with Jamie Fenn who was inside his Dalek, **photo 14**, zipping around and engaging with people of all ages. Jamie also modelled the trench scene from Star Wars. In the same area was Malcolm Barker with his amazing Kin’x Fun Fair, raising money for GOSH (Great

Photo 8: Showman’s Organ.

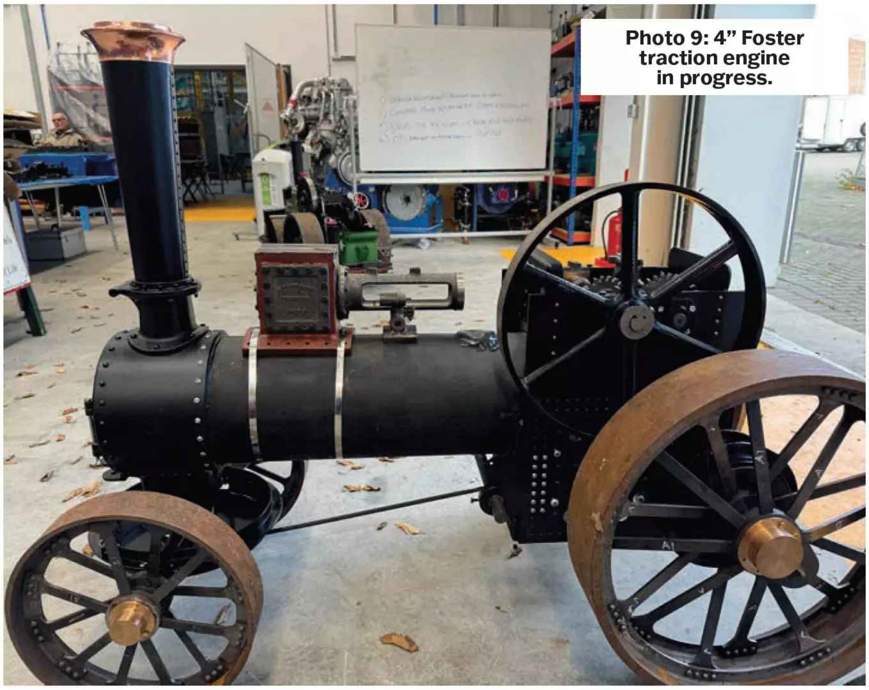


Photo 9: 4" Foster traction engine in progress.

Photo 10: *Burler* and *Magic.*

Ormond Street Hospital).
A huge floor area was dedicated to the Ipswich & District R/C Truckers with their astounding townscape, which boasted two 10ft tall cranes, **photo 15**. One of Dean King's 5" class 66s went on a journey of its own, courtesy of the Ipswich R/C club. They transported the class 66, on two Mammoet heavy haulage lorries, and trundled it around the two exhibition display buildings **photo 16** – unloading it with the 10ft R/C cranes and then reloading it and returning it. The skills demonstrated by that fun manoeuvre were very impressive – and noisy.
In other separate areas were models of aeroplanes of all sizes; boats of all types, dioramas – a large and very detailed one of Duxford – as well as small, beautifully painted presentations; paper models that look as though they are made of metal; Lego cities; Simulators and 3D printing demonstrations – and that doesn't come near to what was on offer.
Lowmex has made a very modest profit each year, and those proceeds have always been used to help local people. Last year, Lowmex provided some specialised equipment for a little boy who has a very rare form of epilepsy. This year, we hope to provide a specialised swing built for him.
As I said at the start, the hardest thing about writing this article has been choosing what to include from thousands of different, excellent models, from all genres of model making, we all have our bias's. So, why don't you come along next year on the weekend of Saturday 31 October and Sunday 1 November 2026 to the next Lowmex and find your favourite – you'll be spoilt for choice. In the meantime, check out Lowmex.co.uk to see what you missed this year.

Photo 11: 1:6 scale WW1 tank.

Photo 12: Tiger (left) and Comet tanks.

Photo 13: One of the Norwich Droids.

Photo 14: Full size Dalek.

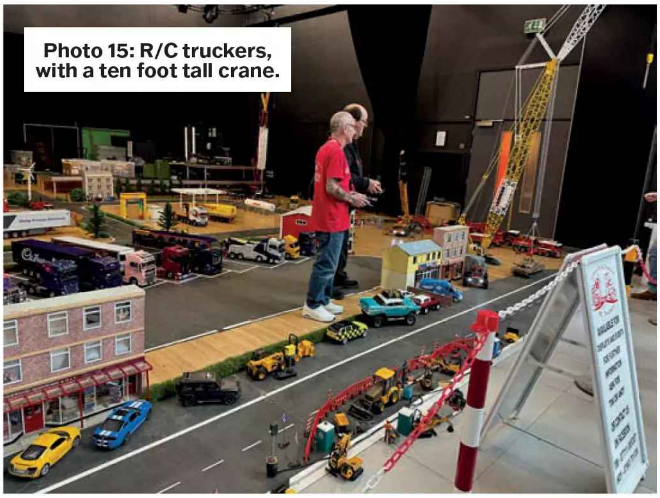


Photo 15: R/C truckers, with a ten foot tall crane.

Photo 16: Mammoet heavy haulage in miniature.

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

February

15 Stafford & District MES Steam up, County Showground, Stafford, 10:00 am. See www.sdmes.co.uk or Facebook.

21 Gauge 1 Yorkshire Group Running day at Drax Power Station social club, 9:30 - 15:30. Contact secretary@gauge1north.org.uk

March

21 Gauge 1 Yorkshire Group Running day at Drax Power Station social club, 9:30 - 15:30. Contact secretary@gauge1north.org.uk

22 Stafford & District MES Steam up, County Showground, Stafford, 10:00 am. See www.sdmes.co.uk or Facebook.

22, 29 Bristol SMEE Public Running day, Ashton.

April

5, 16, 19 Bristol SMEE Public Running day, Ashton.

19 Stafford & District MES Steam up, County Showground, Stafford, 10:00 am. See www.sdmes.co.uk or Facebook.

19 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.

May

3, 4, 24, 25 Bristol SMEE Public Running day, Ashton.

17 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.

23-24 Bradford Model Engineering Society Event at Bradford Industrial Museum

June

5-7 Cardiff Model Engineering Society 34th Welsh Locomotive Rally Heath Park, rally@cardiffmes.com.

7, 14, 28 Bristol SMEE Public Running day, Ashton.

15-14 Rugby Model Engineering Society. Sweet Pea Rally, To be held at Rainsbrook Valley Railway.

20-21 South Cheshire Model Engineering Society LittleLEC annual locomotive efficiency competition, Willaston, near Nantwich. littleLEC@gmes.org.uk.

21 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.

July

5, 26 Bristol SMEE Public Running day, Ashton.

19 Gauge 1 North Live steam on the Ridings track, traders and society stands North, Agriculture and Business Centre, Bakewell. Contact: secretary@gauge1north.org.uk

19 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.

August

2, 30, 31 Bristol SMEE Public Running day, Ashton.

16 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.

September

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, 20 Bristol SMEE Public Running day, Ashton.

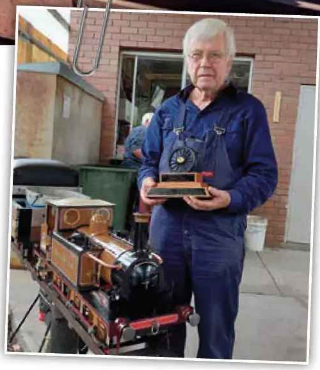
October

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.

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.

An LB&SCR Terrier in 5" Gauge PART 2



Bruce Boldner describes some of his approaches to the construction of a London, Brighton and South Coast Railway A1 Class Locomotive in the penultimate part of this series.

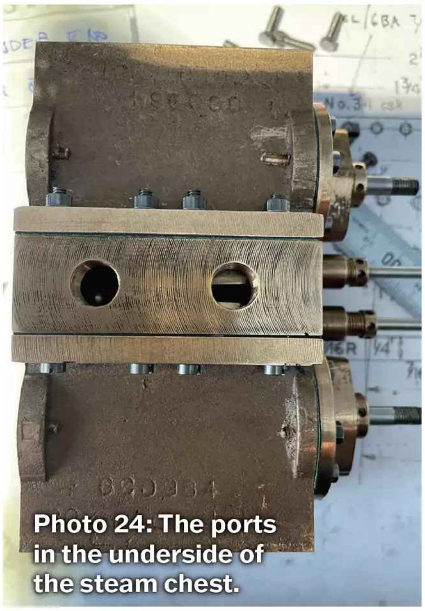


Photo 24: The ports in the underside of the steam chest.

Two openings are indicated in the bottom of the steam chest. The rear opening (to the right in **photo 24**) is for a drain cock, whereas the left hand opening is supposed to be an observation port, to enable visual setting of the valves on their spindles in relation to the ports. I found it impossible to sight the valves through this port, even when using a miniature camera.

I therefore disassembled the steam chest from the cylinders, then measured the distance that each valve spindle protruded from the steam chest, when the valve began to open/close each port, etc. I then reassembled the cylinders to the steam chest and replicated these measurements before tightening the locking grub screws securing the valve spindles. **Photograph 25** shows a rear view of the completed cylinder block.

I purchased a set of body platework plus expansion links from Model Engineers Laser. MEL produce time-saving parts of excellent precision. It was a simple matter to machine out the slots to size in the expansion links using a rotating sector plate jig in the mill, **photo 26**.

The Terrier has two slide bars per cylinder placed horizontally. I machined these out of gauge plate. The cutouts on the inner bars are to provide clearance for the lifting arms to the expansion links. **Photograph 27** Shows piston rods and valve rods fully assembled through the motion plate.

Photograph 28 shows a bracket bolted to the crosshead in the left of picture. This was to provide a drive to a crosshead water pump. After initial problems with the crosshead pump, it appeared to be giving a lot of power

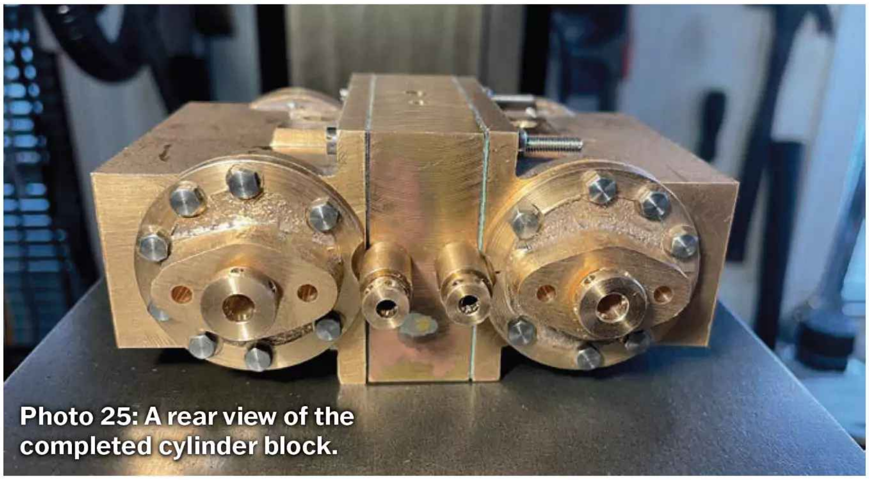


Photo 25: A rear view of the completed cylinder block.


Photo 26: Machining the expansion links.

reducing resistance, I realigned it and it works well.

At this point, I found some nice Tasmanian oak at a hardware chain-store, from which to make the brake blocks, **photo 29**.

The smokebox door was then machined, **photo 30**, followed by the smokebox ring, **photo 31**. The chimney was held in the mill vice on a mandrel while the base was scalloped out to conform with the boiler, using a boring head, **photo 32**, then finished off in the chuck, **photo 33**. The smoke box saddle was also scalloped out with the boring head, **photo 34**.

Then began assembly of the laser cut platework, using 965 solder, **photo 35**. Side tanks had of course to be sealed to hold water, **photo 36**.

Pipes from the bottom rear of these tanks went rearward under the footplate valance on each side, to connect with the rear water well tank beneath the coal bunker, **photo 37**. **Photograph 38** shows the water pipe junction from the side tanks into the water tank under the coal bunker. It also shows the brass ash guard over the driving axle that I subsequently dispensed with.

Photograph 39 shows the foot-steps which are fitted below the footplate valance on each side These were cut by Model Engineers Laser in steel, (not brass, which might have been expected,).

The Martin Evans Terrier has a boiler diameter of 3.75". After allowing a little extra for lagging and cladding, I scalloped out the base of the steam dome casting to conform to this diameter with the boring head in the mill. The dome was held by a spigot clamped horizontally in a rotary vice on the milling table. It looks a little precarious, but only light cuts were taken, **photo 40.**

Next came boiler construction. The boiler (rolled and butt strapped from a sheet of copper) was roped to the mill vice so that holes for the chimney and dome could be bored with the boring head, **photo 41**.

Brackets were bolted to copper plates silver soldered to the firebox sides. These brackets sat on the tops of the frames to support the rear of the boiler, **photo 42**.

Photograph 43 shows the exhaust pipes from the cylinders joining into the blast pipe casting, with

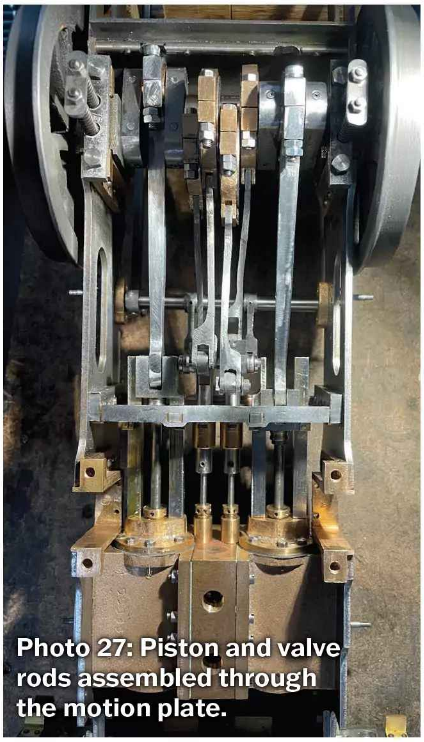


Photo 27: Piston and valve rods assembled through the motion plate.


Photo 28: Cross head bracket.


Photo 29: Wooden brake blocks.

Photo 30: Machining the smokebox door.

Photo 31: Machining the smokebox ring

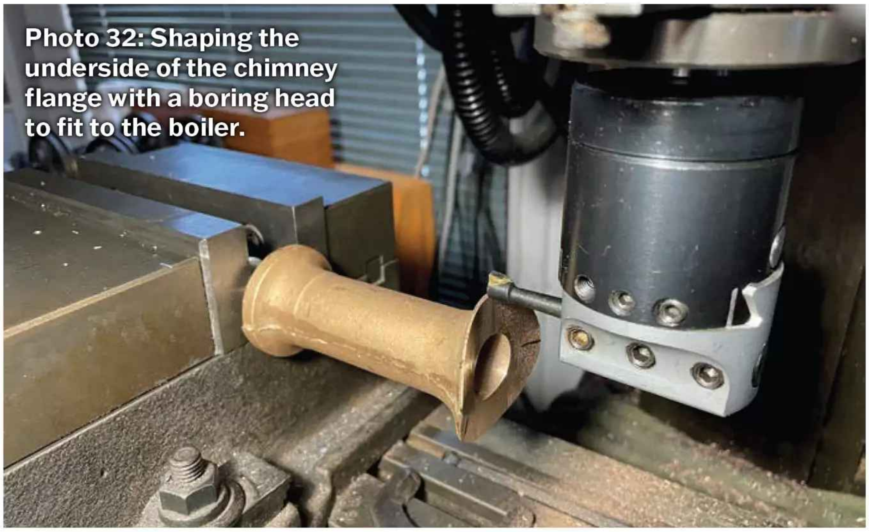


Photo 32: Shaping the underside of the chimney flange with a boring head to fit to the boiler.

blast nozzle atop. The small pipe fixed to the left of the nozzle is the blower pipe, fed from a valve at the backhead via a hollow horizontal stay running the length of the boiler. The blower pipe has not been connected to the blast nozzle in the photo. Steam to the backhead valve is sourced from a pipe in the steam dome. The larger curved pipe to the right of the blast nozzle is connected to the header and directs steam to the cylinders.

The snifter valve is seen attached through the smokebox top left. It is hidden externally within the large diameter dummy copper steam condensing pipe running from the smokebox to the front of the right water tank.

The 5” gauge Terrier has a small boiler and cylinders, therefore needs all the help it can get to generate power. Radiant superheaters of stainless-steel tube were therefore fitted, extending across the roof of the firebox to the rear firebox wall. The spearheads were TIG welded by friend and fellow club member Chris Murray, who is a professional welder.

The plans indicate that two boiler blowdown valves should be fitted, one on either side of the firebox, down low and just to the rear of the throat plate. In my opinion, these are not ideal positions, as their location is somewhat above the lowest point of the boiler, meaning that some sludge will always remain after blowing down. The ideal position would be in the centre of the front foundation ring of the throatplate. However, tight clearances made this impossible.

I in any case, only installed a

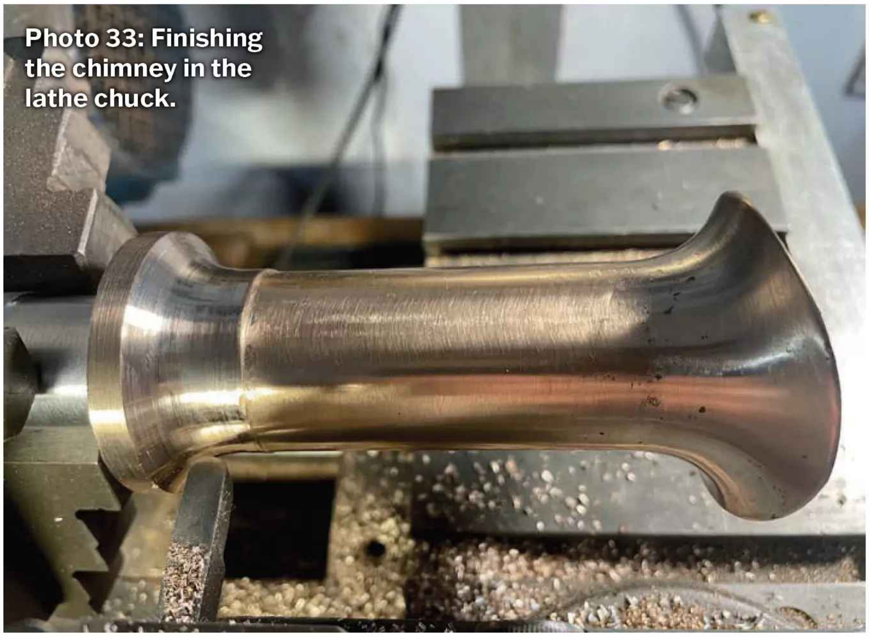


Photo 33: Finishing the chimney in the lathe chuck.

Photo 34: The smokebox saddle was scalloped out with a boring head.

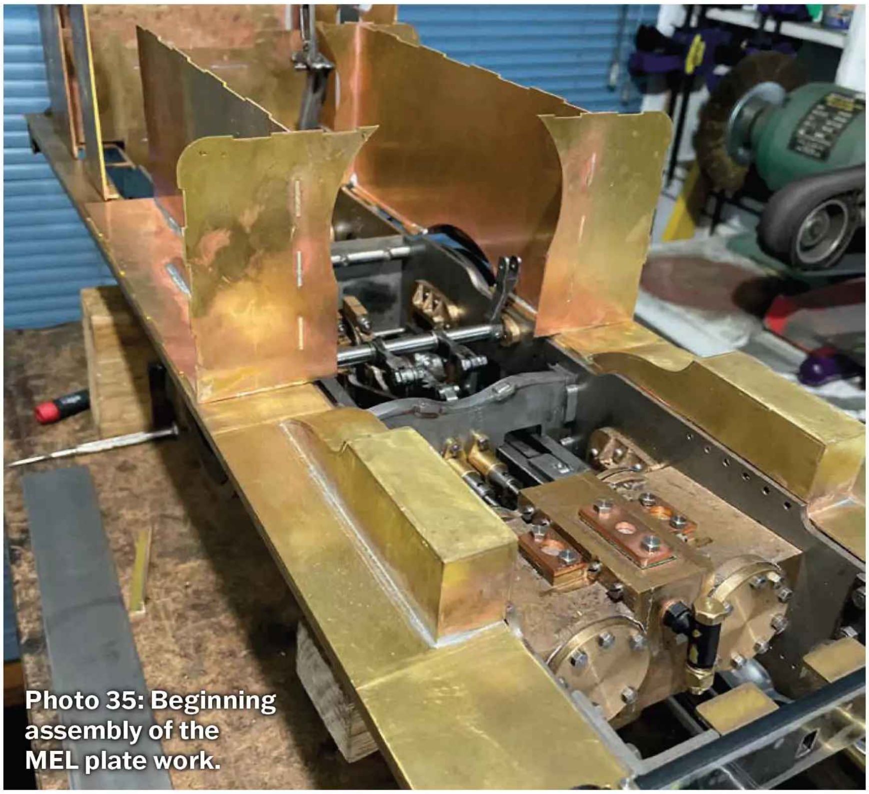


Photo 35: Beginning assembly of the MEL plate work.

Photo 38: The water pipe junction from side tanks to rear tank.

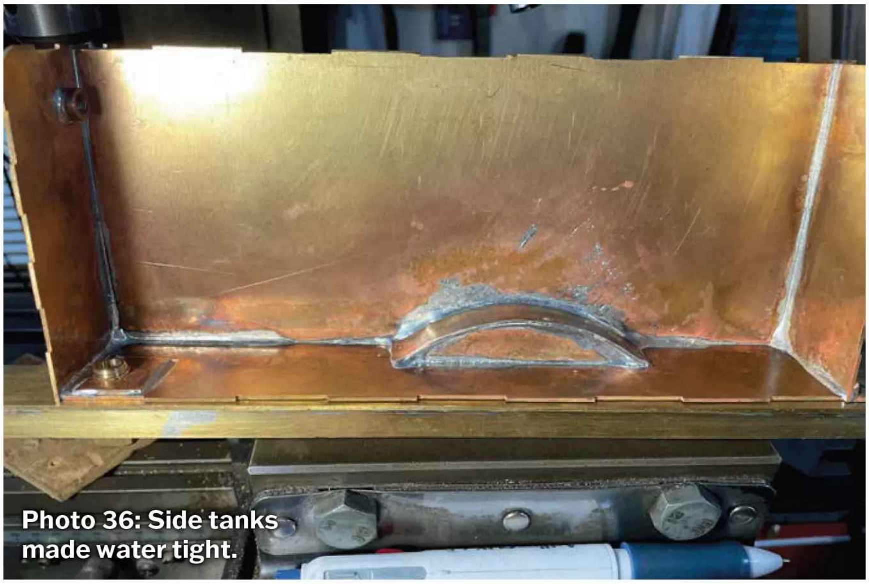


Photo 36: Side tanks made water tight.

Photo 39: MEL footsteps.

Photo37: Connections to pipe water between side tanks and rear bunker tank.

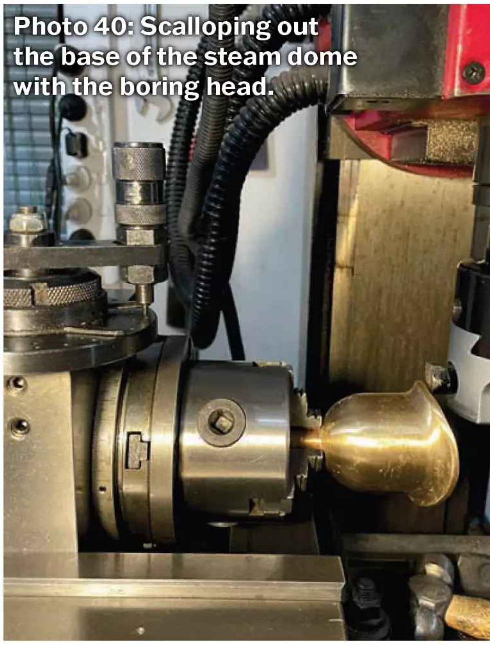


Photo 40: Scalloping out the base of the steam dome with the boring head.

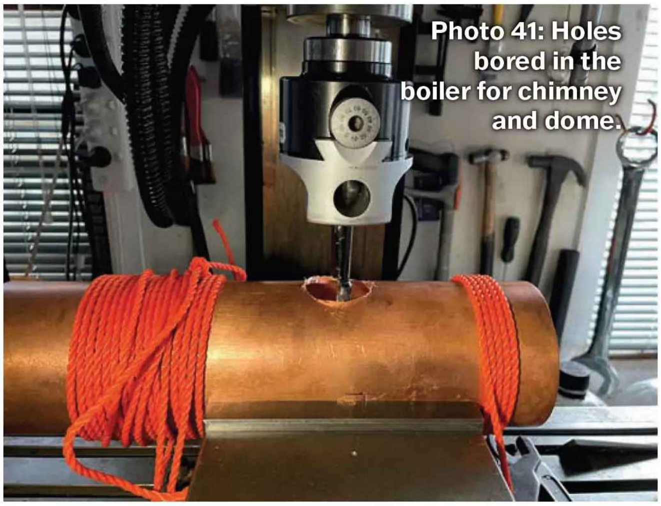


Photo 41: Holes bored in the boiler for chimney and dome.


Photo 42: Rear boiler mounting brackets.


Photo 43: Exhaust piping from the cylinders to the blast pipe.

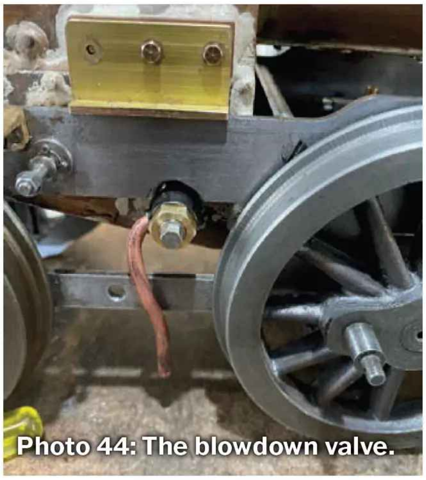


Photo 44: The blowdown valve.


Photo 45: The regulator was a tight squeeze.


Photo 46: A rear view of the boiler in the frames.

blowdown on one side. Another inconvenience caused by this positioning is that the valve extends through the side frame and must therefore be unscrewed in order to remove the boiler from the frames, **photo 44**.

A Stroudley type regulator was fitted within the steam dome and was an extremely tight squeeze within the steam bush, with the OD of the latter restricted by the ID of the dome casting and the ID of the bush unable to be reduced too much, lest the overall mass of the bush was reduced below the amount required by our Australian boiler code. The fit was so tight that the rotating valve disc and operating arms had to be assembled after the body of the regulator was inserted through the bush into the boiler, **photo 45**.

Photograph 46 shows a rear view of the boiler sitting in the frames. The copper pipe leading to the left front boiler clack feeds water from a tank in my riding truck powered by a 100psi electric pump. Heresy, you say!? Let me tell you that it gives great peace of mind to know that you can put water into the boiler when those pesky injectors decide not to cooperate. In fact, I didn't install any injectors on the Terrier. Why bother? In Australia, we are required to have a minimum of two methods to get water into the boiler. My second method is a hand pump in the right-side water tank, which I doubt I will ever have to use.

The top nuts of the two water gauges are also shown in the photo. I decided to install the nuts on the top curve of the backhead, in order to provide longer sight glasses. Two horizontal stay bushes are also visible. The left side stay is solid. The right side is hollow and ducts steam to the blower in the smokebox.

To Be Continued

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 and they will win **£30 in gift vouchers from Chester Machine Tools**. Visit **www.chesterhobbystore.com** to plan how to spend yours!

STORAGE FOR LARGER DRILL BITS

Our tip winner this month is William Waddilove who offers advice for storing big drills:

One of my problems in the workshop was how to store large drills so they are readily available and easy to find.

In the photo you will see the 'standard' large sets of drills in their boxes; Imperial and Metric sizes.

Next to it is the big drill storage rack. This is a rectangular metal oil can with the top cut off and in it are lengths of plastic waste pipe. They are held in place by building foam.

This gives a sturdy rack, and each individual drill can be easily located. I have also written the drill size on the end with a pen.

Above it is a long plastic box for long drills. The bins to the right hold the various bolts and clamps used on the lathe.

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.

A Chuck Lifting Handle

Bernard Towers makes an aid to lifting heavy chucks.

This handle, **photo 1**, is not a necessity, but nice thing to have and it makes lifting chucks out of snug fitting boxes a doddle. Not only that, as mine are for screwed chucks, it is a nice exercise in the art of screwcutting at which we all need some practice. The great thing about the screwcutting is that it does not need to be thou (0.025mm) perfect but a fit that will not pull out under the weight of the chuck. If, like me, you have a magnetic chuck or a 4-jaw concentric the handle is well worth it as these chucks are quite heavy. It's nice to have one for each chuck but not necessary, as it can be screwed in very quickly to lift the chuck out of the box.

The threaded dummy mandrel, sized to fit my chucks, was made from some scrapbox aluminium bar of 40mm dia. Total length of the insert is only 1.250" with threaded portion 0.687" long including the recess and the register just 0.250" long leaving the rest of the body full size and 0.313" long with a cross hole 2BA clear central to the 0.250ins measurement for the fitting of the handle.

The handle is made from 5mm steel round and is 3 ¼" wide with 1 ½" legs, two spacers are required and they are from 6mm round bar with a 2BA clearance hole 1" long. The pivot stud is made from 0.187" round bar 4" long with a short 2BA thread on either end. If a scrap piece of 0.187" bar is used as a jig, the handle and the two spacers can be silvered together. That's it and it's surprising how handy they are, I say that as it's just as easy to make two or three, **photo 2**.

Of course the threaded portion on mine could be substituted for whatever chuck fixing your lathe has. Just use dimensions to suit your chuck. You can also use Metric measurements; M5 is a good substitute for 2BA.

Photo 1: The chuck lifting handle.

Photo 2: Parts for additional handles.

Photo 223: Doug at work in the smokebox of 43106.

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

PART 24

Doug Hewson continues work on the smokebox.

Figure 91 is the development of the smokebox that belongs with part 23. This part looks at the superheaters and their connections, I will revisit the superheaters themselves in more detail later. I had decided that all my engines should have a double row of superheaters, having seen the tube plate which had been removed from 80078 at Llangollen during its overhaul from Barry condition. I looked at this tube plate and thought that we didn't use half enough superheat in our 5" gauge engines so I set out to address this problem. I therefore set to and decided to re-configure my 4MT boiler drawing to accommodate a double row of superheater flues and built my boiler to suit. I was convinced that this must be the way to go. I know that a lot of model engineers will hold their hands up in horror at what I have done. The problem with some people is that they rarely get and uninterrupted run. At Gilling the express passenger trains generally have a continuous run of 40 minutes with one stop for water. If you have never been to Gilling, then you won't know how we run. It is more or less the same with the parcel trains and the through goods trains. However, now I wished that I had drawn it to take three sets of flue tubes as it has been such a success. I had

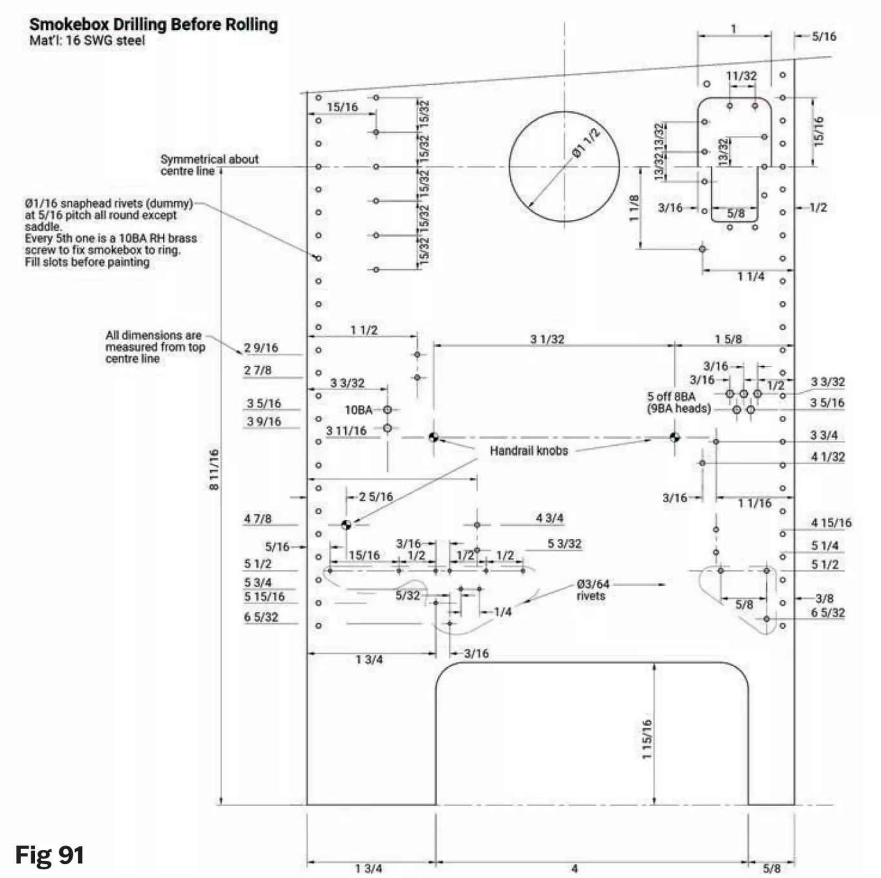


Fig 91

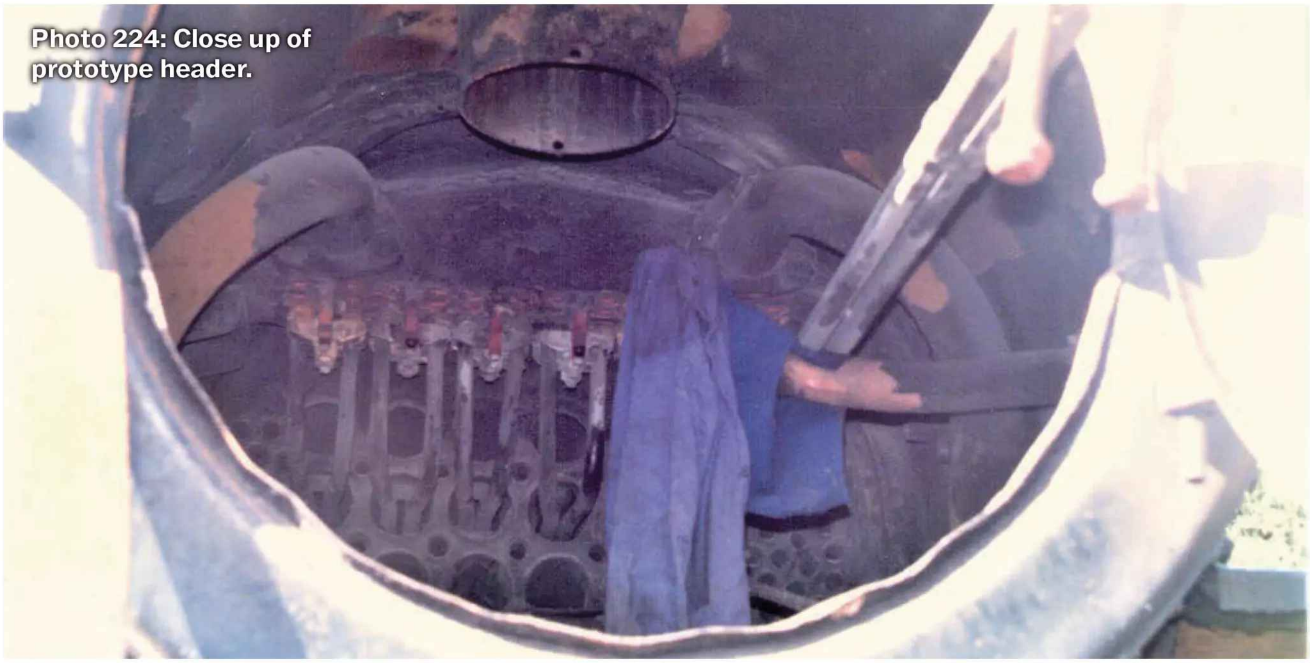


Photo 224: Close up of prototype header.

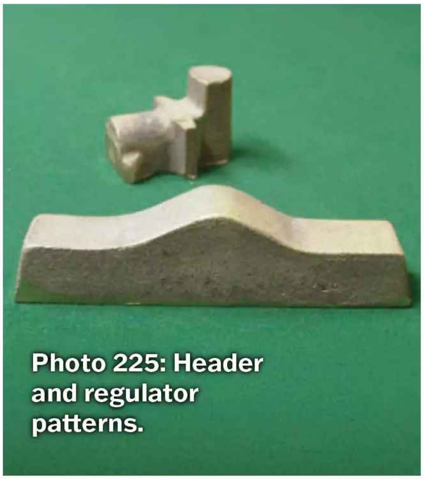


Photo 225: Header and regulator patterns.


Photo 226: Petticoat pipe.

to obtain some special tubing for the elements of course, but the idea came to me when I received a package from good old Whiston's in days gone by. The usually sent me a free gift with an order and my free gift was 20 metres of 5/32 x 24g stainless steel tube. It just lay in my workshop for years until someone alerted me to the fact that it could be bent double without it kinking. I tried a length to see if it worked and sure enough and not only that, I could bend it so that it would fit inside a ¾" x 18swg tube. My Y4 needed new elements so I made some new ones for that as one of the old copper ones had some pin holes in it. At the next Gilling Rally, I had booked myself for a two hour shunting turn from 8am onwards but I could not believe it but I was shovelling coal uphill most of the time as I was used to visiting the water column every 20 minutes, but now I found that I was only had to visit the water column every 40 minutes now and it was a pleasure not to get a shower every time I set off. On that turn the work is intense as not only is there shunting to do but 'D' Pilot also has to clear the two loops as incoming trains arrive.

I also made a good inspection at close quarters of how the superheaters were fixed on 43106 when I was working down at the Severn Valley Railway for a week. **Photograph 223** shows me getting a bit grubby removing the superheater elements from 43106. I was set the task of removing all of the elements from that engine ready for its overhaul. The fixings were so simple that I thought I would copy those for my 4MT and since then they have not been any problem. **Photograph 224** shows how the header is fixed, well not quite but I hope you will get the idea, and I also copied the fixing from my Y4 as it only involves removing two 5BA nuts and removing the petticoat and the whole lot can be withdrawn including the header and all the elements. From this I devised a new header and made a very simple pattern to have them cast. Lots of them, as I just couldn't believe how many people thought that they were a good idea, and we also supplied lots of people with the elements too.

Photograp 225 shows the patterns I made for the header and also the regulator. Also, **photo 226** shows my petticoat pipe which really ought to have gone in the previous article. **Photograph 227** shows the inside of Geoff Whittaker's smoke box as he also fitted the same header when building his Class 4 4-6-0, 75069. His engine also had a double chimney as well.

When machining the header casting, **figs 92** and **93**, you need to set the depth stop on your drilling machine otherwise you could be in real trouble, especially when you come to drill the holes for the elements. The wet and dry headers are combined in one casting, as per the full size one, but you need to be very careful, so it needs quite a lot of thinking about. First of all, I drilled the two holes for the for the galleries which go full length of the casting. Of course, I didn't have a drill long enough to I drilled it from both ends and **photo 228** shows this.

Photograph 229 shows me drilling the holes for the elements. **Photographs 230** and **231** shows me again spot facing the area for the steam outlets and also tapping the ends for fitting some plugs in the ends which can be silver soldered in. **Photograph 232** shows the completed header installed. I have also included a couple of photos of Geoff's which show how the superheaters can easily be withdrawn

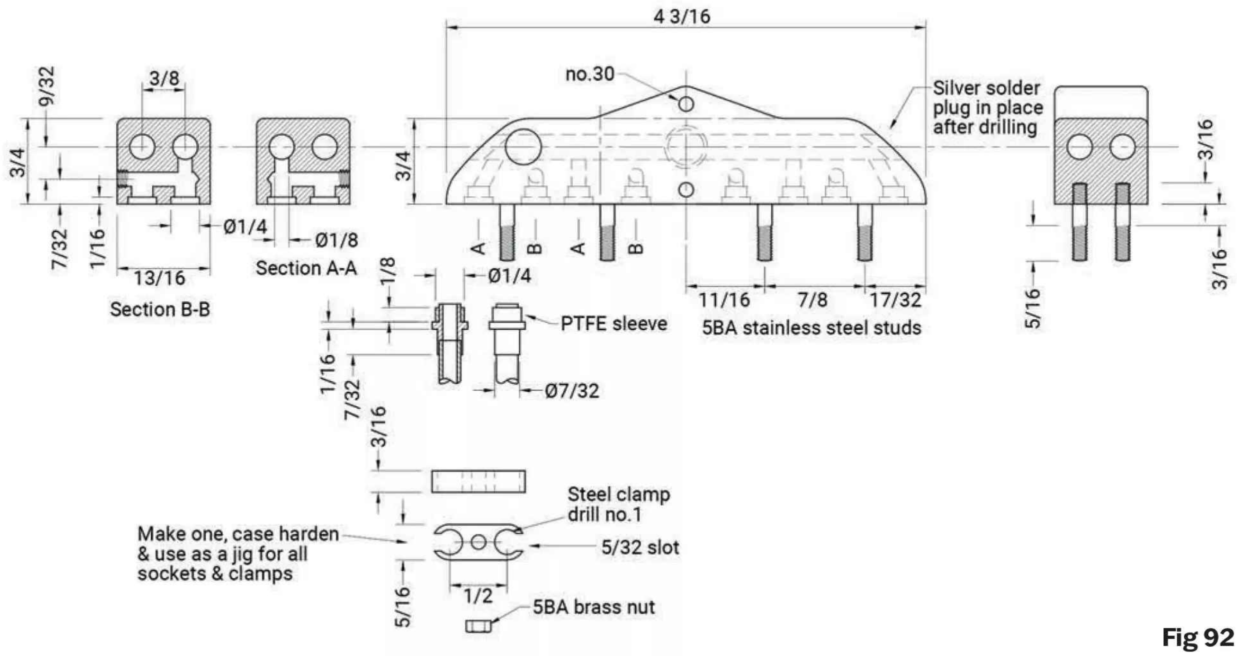


Fig 92

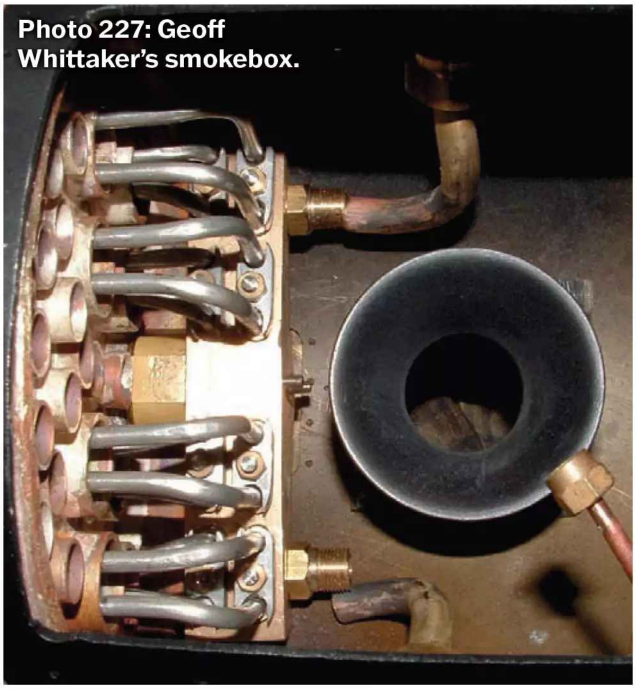


Photo 227: Geoff Whittaker's smokebox.

Photo 228: Drilling header.

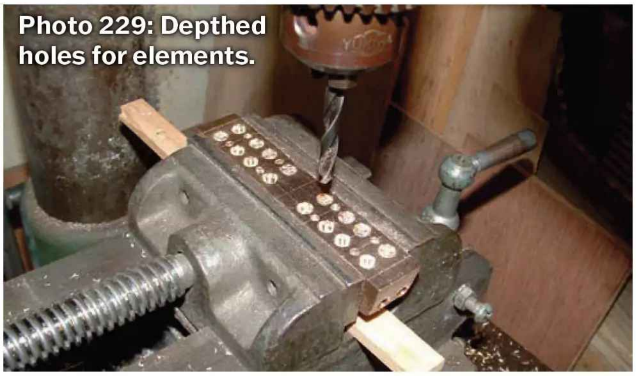
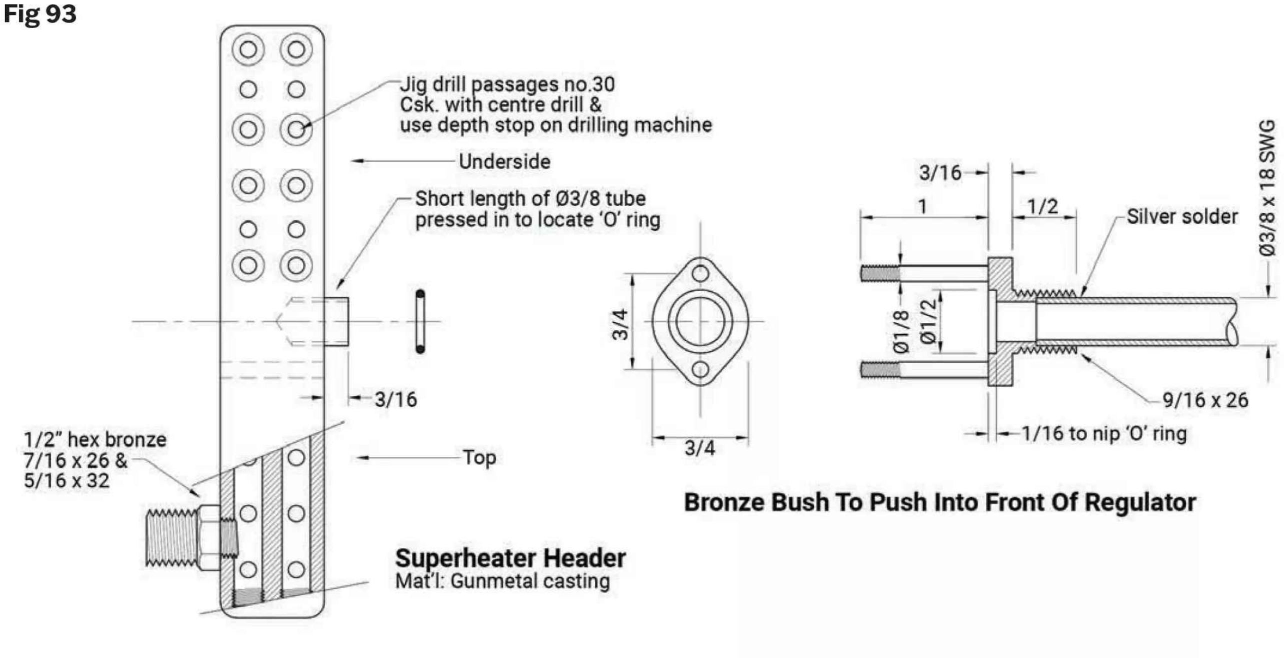


Photo 229: Depthed holes for elements.

Photo 230: Spot facing.

Fig 93



and the fixings, **photos 233** and **234**.

Photograph 235 shows lots of elements being readied for packaging to go in the post and this represents less than a day's supply and I have to say that we were absolutely inundated with orders.

Now we come to bending the elements themselves, **fig. 94**. You need some bobbins turning from something like 5/8" bar and the grooves need to be 5/32 wide and the depth of tube with next to no clearance and then the tube should not distort when bending it. You will need to bend the tubes to shape when turning them up to meet the header. They are surprising easy to bend and can easily be done with a

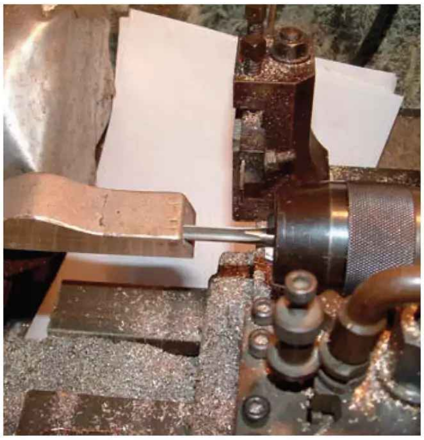


Photo 231: Tapping for plugs.

Photo 232: Header installed.

Photo 233: Geoff's header.

Photo 234: Withdrawn as a unit.

Photo 235: Batch of superheater elements.

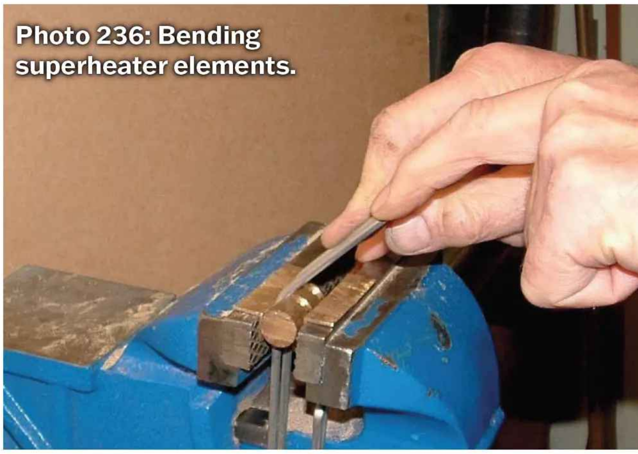


Photo 236: Bending superheater elements.

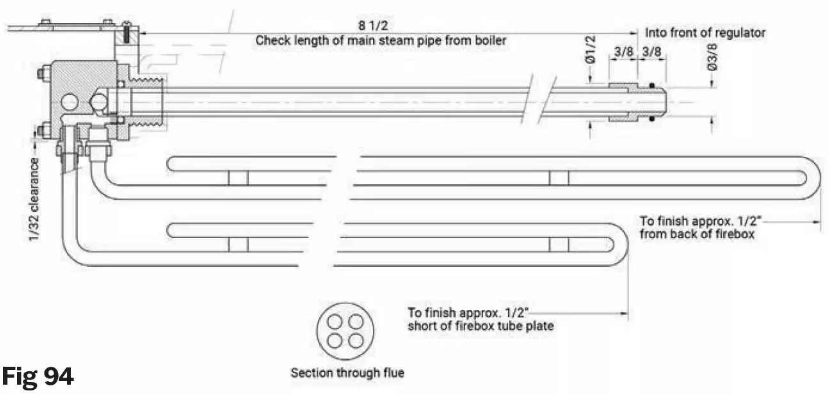


Fig 94

Photo 237: Nipping up slightly distorted elements.

little finger pressure. **Photograph 236** shows me making the first bends in the elements for my own 4MT and you will see that I turned double grooves in the bar so that they could be bent together, which I think must be fairly obvious! **Photograph 237** shows me taking out what little bit of distortion there was by nipping it sideways in the vice just restore the roundness.

Photograph 238 shows 76047 passing through Hooton with a very long through goods train, and the fireman is controlling the steam very nicely as there is just a wisp of steam from the safety valves. I have also included **photo 239** which shows another Mogul, 76049 at Hawick on 22 October 1963. He must be on a pick up goods but I can't see any lamps. The engine also as a BR2 tender and as is often the case the filler lid has been left open!

To be continued

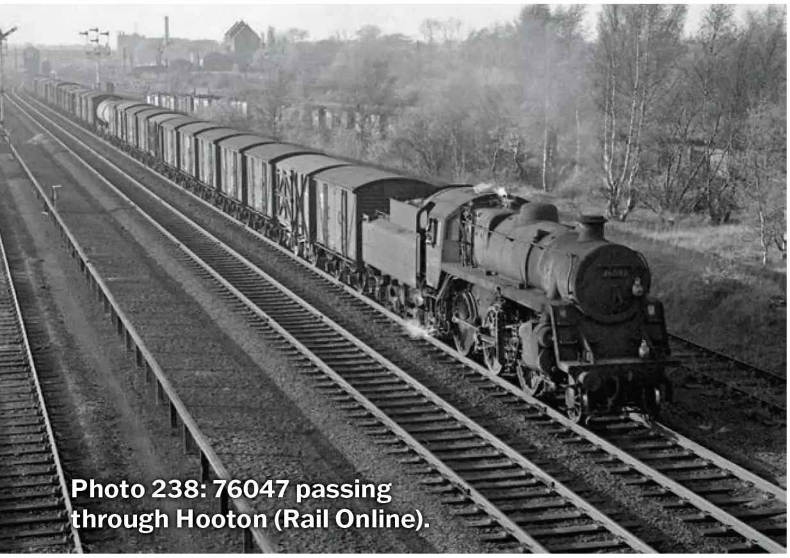


Photo 238: 76047 passing through Hooton (Rail Online).

Photo 239: 76049 at Hawick (Rail Online).

Photo 1: The original L&NWR tender, note the conspicuous rivets.

A Punch Tool for Simulating Rivets

Chris Rayward uses a reverse swaging technique to simulate caulking seam rivets, using 5" gauge locomotives as an example.

Some time ago I designed a representative six-wheeled Ramsbottom tender for my 5" gauge L&NWR 2-2-2 Lady of the Lake passenger engine which has a horseshoe shaped water body. As per the prototype, **photo 1**, the whole water tank was riveted together, but the particular requirement of reproducing the finely spaced rivets that represent the caulked seams around the main joints of the tank, plus the vertical ones where plates are joined together seemed a fraught task. The thought of drilling the holes for then adding dozens of small rivets seemed a step too far, both in terms of accuracy and ensuring a leak free result, so a simpler and more reliable method was called for.

I had briefly used the approach described here for the very limited embellishment of riveting on the top of the side tanks and bunker plates for my L&NWR0-6-2T Coal Tank design and the proposal was briefly described in Engineering in Miniature in September 1997.To introduce the task, a view of the nearly complete but unpainted tender is shown in **photo 2**. My objective here is to describe the forming technique and then offer some guidance as to the construction that is required for those that may wish to do likewise.

Photo 2: The as yet unfinished tender made by the writer which is the standard tender for the early L&NWR locomotives by Ramsbottom and Webb.

THE TOOL

The use of a reverse punching technique has long been a useful method adopted by builders of very small-scale model locomotives to add the rivet detail to the engine and tender plate work. The approach uses a specially prepared steel punch in a robust frame to swage the metal (usually half hard brass sheet) into a matching anvil. **Figure 1** shows the tool frame design and the dimensions for the punch and the anvil for the generation of rivet heads that match the head form of the more usual 3/64" brass rivets they represent. **Photograph 3** shows the rivet simulation tool which has seen significant service. To save a lot of milling and filing, the frame is available from Ed Parrot at Model Engineers Laser as a neatly cut ½" thick steel profile that will require just a minimum of cleaning up prior to adding the drilling and reaming for the punch and anvil locations and the threads for the 4BA securing screws for the anvil and the fence rod. The punch and anvil pair are sized for creating rivet heads in 18 SWG half hard brass sheet. Both the punch and the anvil should be made from silver steel, and it is suggested that the anvil especially, is used for a trial before both are hardened and tempered so they will not deteriorate. This will give the anvil a slightly rounded internal surface and create a pleasing effect. Note that the design includes a light spring to raise the punch from the material.

Photo 3: The swaging tool developed for the 3/64" brass rivet size but it is adaptable for other applications.

PRACTICE MAKES PERFECT

Some initial practice on a scrap of the18 SWG half hard brass sheet is suggested to get the feel of the process for those who are new to this method. Clearly, the geometry of the rivet layout will have been decided upon before making any impact on the reverse of the brass sheet. The pitch or spacing of the simulated heads is determined by the diameter of the top face of the anvil and for the model shown above, the spacing was decided upon as 1/8"; then, where the rivets represent a caulking seam, the fence was also adjusted to allow the contact to be 1/8" in from the edge of the sheet. So, hold the sheet squarely towards the tool and as flat as possible on the anvil. Test the position of the punch compared to any scribed reference mark. It will be found that the punch is best struck with a 1/4lb. hammer, lightly to start with and at least three strikes should settle the punch firmly home into the shape intended. Do not expect the process to be completed with just one heavy hit as there is a danger that the swaging will result in holes being made instead! Also, the heavier the blow the more like the punch is to sit in the sheet and when it comes out – the punch, with its spring, can go anywhere! The next swaged rivet head is formed by disengaging the first one and holding the sheet so the edge of the first head is against the outside diameter of the anvil, then the task is repeated. It will be found that the method has a rhythm and with due care a line of swaged heads can be produced evenly and quite quickly. **Photograph 4** shows some work in progress.

The travel for the indentation can be in either direction but do not be concerned that the swaging effect produces a bow to the sheet as this can be easily made straight again with gentle pressure. The two working parts of the tool that are detailed here are specifically for the creation of the closely spaced caulking seam joints on this tender but can of course be adapted for another design. It may have been noticed that my tender also has several vertical caulking seams and the way they are produced is described next.

JOINING UP THE OUTER PLATES

The sheet brass for the tender body should generally be cut to size before any swaging is carried out as any subsequent clamping for trimming could lead to damage to the work already completed. The vertical join consists of a plate edge with the caulking seam row in place and the mating plate is left plain. To overlap plates of scale thickness is impracticable. so in essence the two plates are butted together.

Figure 2 shows a typical cross-section of the tender body to illustrate the construction and gives the details for the joining mechanism. The plain section of the plating is given a lap plate about ¾” wide which is half lapped and silver soldered to the inside of the plain plate edge. Do note that this lap plate has to fit closely in between the lower and upper brass angles that provide the structure of the tender body. The main plates are only soft soldered to both the upper and lower angles and then the joining plate is soft soldered to the other half of the lap plate and the main angles. Where stiffening brackets are attached the pitch of the rivets can also mean a solid rivet can be added above and below the vertical flange and hopefully my drawing shows this aspect of my design.

To clarify the construction a cross section is given to show how the typical tender side is placed on a 1/16” thick base plate and a support bracket is also shown which is attached at the side and base using normal rivets. Where the bracket is used to link across to the inside ‘horseshoe’ assembly there are holes for a brass bolt and nut to be added. Otherwise, such as in the water space at the rear, these supports are just angled pieces of flanged plate.

My drawing also includes the cross-section of a typical internal support bracket and the detail for the vertical seam joining strips that require a mixture of hard and soft solder to complete. It will be noted that the structure is built on a piece

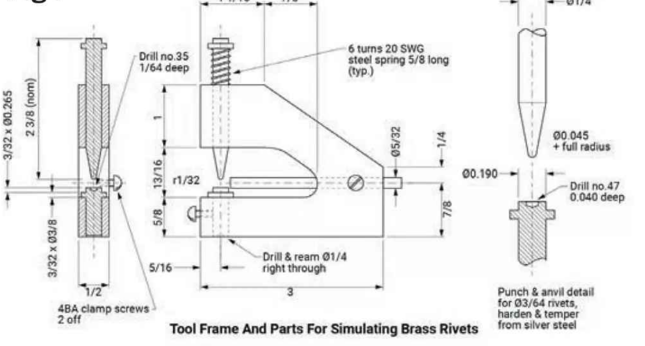
Photo 4: The tool in use. Scribed marks on the reverse of the sheet indicate the scope of the task.

of 1/16” thick brass plate and the support angles are from 3/8” by 3/8” by 1/16” material but forming these details will be given later. Note that the length of the joining strip should just fit between the edges of the top and bottom angles when these are added. **Photographs 5** and **6** show the addition of the caulking seams in several places. These curved plates are bent into the shape needed after the simulated rivets have been added. The clamp for the chosen round bar just needs to be adjacent to the rivet pattern on the outside but the vice jaw should be full length on the inside. The exception to this was the group added to the bottom of the corner flair section; the flare was formed first and the ‘rivet heads’ carefully added afterwards.

Photo 5: Close up showing how convincing the false rivets are.

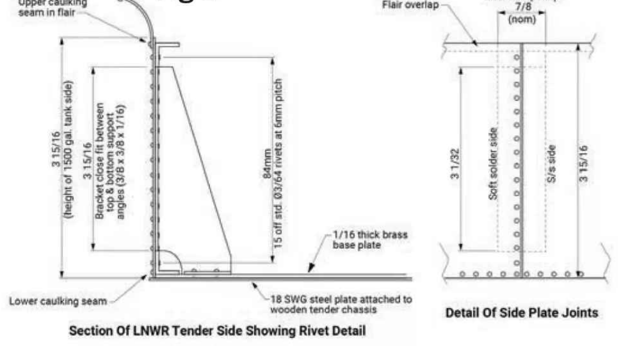
Photo 6: A wider view of the tender under construction.

Fig 1



Tool Frame And Parts For Simulating Brass Rivets

Fig 2



Section Of LNWR Tender Side Showing Rivet Detail

Detail Of Side Plate Joints

Spindle and wear adjustments

By Geometer

BEARINGS with a slit along the side closed by a clamping screw, or the type with a removable shimmed cap, may be employed for spindles on the smaller and simpler machine tools as mentioned in the previous article. But for many purposes these easy methods are not considered entirely satisfactory? particularly when accurate alignment and all-round support are required for spindles.

On a machine tool such as a lathe, in closing a normal split plain bearing, two effects occur; the spindle alignment is altered slightly in relation to the bed (spindle drop); and the bearing is no longer quite circular but grips and supports mainly on the diameter on the line of adjustment. Employing, however, conical bearings or bearings with conical adjustment, both alignment and all-round support are maintained.

A simple arrangement of conical bearings is as A, the two cones rotating with the spindle. That at the chuck end is fixed, while the other, which may be keyed, can slide when adjustment is made by the nuts. The bearings with tapers corresponding to the cones,are in parallel holes in the casting or headstock and have small external flanges preventing end movement.

To obviate the front bearing running tight or seizing under cutting loads, either a single ball or ring with separate adjustment is fitted at the left or rear of the spindle (not shown) to take thrust. This adjustment should be slackened before adjusting the bearings,

Adjusting conical bearings

Conical adjustment on bearings for a parallel spindle is arranged as ***B***. The casting or headstock has taper holes containing split bushes, each adjusted by two nuts. To close the bearing, nut 1 is slackened and nut 2 tightened, at the finish both nuts being tight. A ball ring thrust and end-play on the spindle are regulated by nuts on the spindle. This adjustment, too, should be slackened for adjusting the bearings. On small and medium-sized lathes, taper roller bearings may be employed as C.

For heavy duty machines, the arrangement lacks rigidity with the bearings widely separated and the casting subject to deflection and "give." As a result, two bearings in opposition,. C, may be used in a short housing at the chuck end, and a plain parallel roller at the rear. Two opposed bearings may also be used at the rear if they are in a sliding housing in the casting, for spindle location to be solely on the chuck end. bearing.

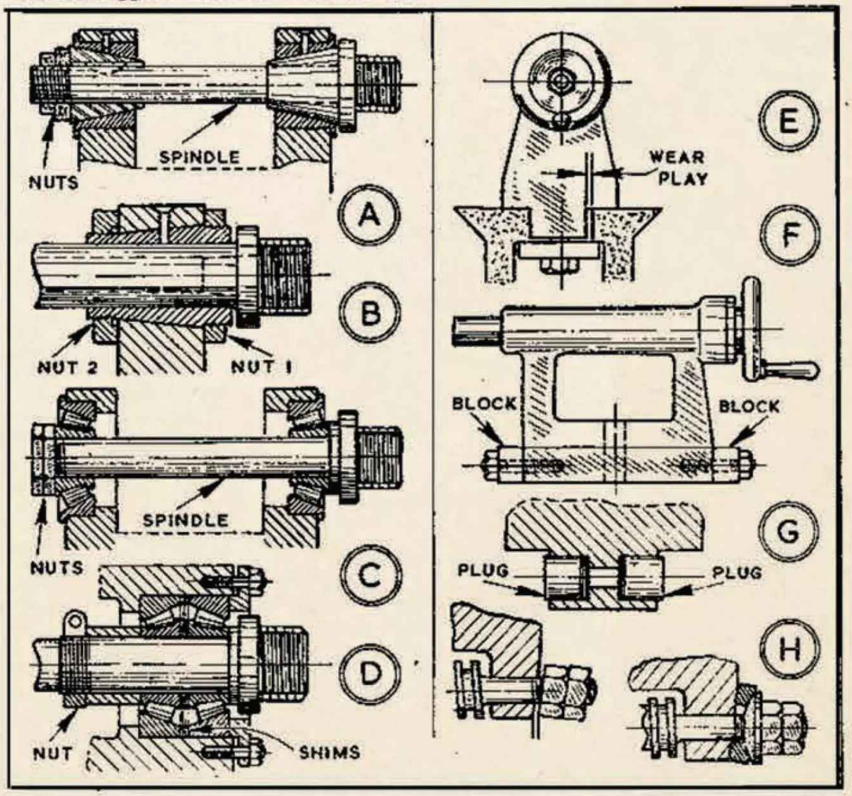
On some machines, a back-to-back arrangement of taper roller bearings is employed, ***D***. The centre members and spindle are held by a nut on the spindle, while the outer members are held by a plate bolted up to the casting. Adjustment is made by shims between the outer members. This permits preload of the bearings to be regulated before they are fitted.

As much as a faulty spindle, tailstock malalignment may result in difficulties or indifferent work. A common fault on flat-topped beds is wear of the tailstock tongue in the central guide-way, ***E***, which permits lateral movement as the tailstock is tightened.

Machining the tongue where it fits in the bed and fitting a packing strip each side is one solution-though it may involve outside assistance. A method which does not is to employ a block at each end of the tailstock, F, holding it with a stud through a clearance hole for the tailstock to be trued before the nut is tightened.

Alternatively, drilled holes opened out with a facing cutter can be provided each end of the tongue to contain plugs with shims, which can be moved side to side to true the talistock, G.

A jerky action on a feedscrew may be due to an inclined face on the locating boss and wobbling nuts on the screw? giving rise on leadscrews to screwcuttmg difficulties. For this reason, some lathes have a self-aligning thrust, the principle of which can be employed as H by means of a hollow washer and rounded nut. ❑



Club News

Geoff Theasby reports on the latest news from the clubs.

The letters page of MEW 4770 concerns my visit to Elvington. My apologies for the confusion I may have caused the by reference to the radio 'shack'' at The Yorkshire Air Museum. In photo 1 I did not refer specifically to the HRO in my use of the word 'neglected', but to the odd device in photo 3, the Chance light. Thanks to my correspondents for this. As a licenced radio amateur for over 50 years I am well aware of the enthusiasm for HRO receivers. I used a similar receiver, the AR88 for many years.

In this issue, don't look, Ethel! Putting the cart before the horse: Oh, Grandpapa, what big feet you have! Contemporary, use? Visibility, Deodand and a Deltic.

One for the road vehicle enthusiasts, a tandem disability scooter, the like of which I have not previously seen. (**Photo 1**)

Photo 1: Tandem scooter.

7 ¼ inch Gauge News, (SQGN) from the **7¼ inch Society**, Winter issue, has a fine picture of Mike Cave's *Tarn Beck* on the cover. Editor, Tim Coles claims a bumper issue this time, More articles will be forthcoming in the next issue, and also, the video of Tim testing his turbo prop engine, to which I previously drew readers attention has 'gone viral' on the internet, with 105,000 views. It develops about 7½ horsepower (Perhaps it should have been 7¼ hp, which would have been more fitting in this Club journal...) The Society's AGM was held at Burnley & Pendle's extensive track in Burnley. Ian Coleby writes on making pointwork, and Caleb Lovegrove has been refurbishing a Class 91 locomotive dating from 1992. (Refurbished? I wasn't even aware of the original type on the Big Railway). Chris Baker writes on low maintenance track, on which the first requirement isn't rolling stock, but track drainage. The portable railway held a meet-up on 2 and 3 August, as reported by Daniel Mason. John Arrowsmith reported on the Midlands Model Engineering Exhibition. W. www.sevenandaquarter.org

Photo 2: *Ethel* - Sheffield Canal wharf.

The **Sheffield & DSMEE** November issue of *Steam Whistle* also covers the MEX, spotting an ornamental turning lathe which I didn't see, and seems to show an attempt to produce a sphere leaving as little material left over as possible. Also, a stainless steel 7 ¼ gauge A4, *Silver Fox*, and its cleading, which was made in Sheffield. W. www.sheffieldmodelengineers.com

Norm Lorton supplies more copies of the Ground level 5-inch gauge Society newsletter, *Turnout*. He also sent back copies of the publication but as I like to keep the content of this column as topical as possible, I shall leave them to the end, so if they are there, readers may surmise that I was running out of copy. In *Turnout 88*, Doug Hewson writes on the lettering of wagons, and in Signalling at Gilling, writes on the above subject, made to 1/8th scale, which is based on LNER practice in the period around the turn of the 19th Century. Andrew Ward writes on making a better driving truck. Tim writes on Loctite high strength retainer, No 638. This piece is very interesting and required reading if this is new to readers.

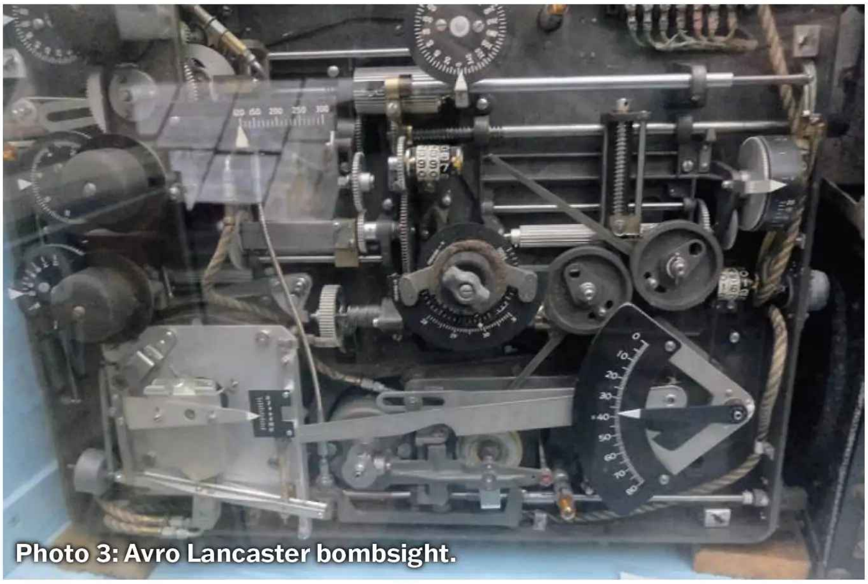


Photo 3: Avro Lancaster bombsight.

According to Bill Hall, *Ethel* makes a grand entrance. *Electric Train Heating Ex-Locomotive* being a 5-inch gauge steam heating arrangement he has just finished. More modern coaches did not have steam heating nor did the Class 37 locomotives at the front. The vehicles were converted from decommissioned Class 25s. There is a sub-plot concerning tailor's flat head pins and Bill's attempts to source them. Coincidentally, on an afternoon canal trip down the Sheffield & Tinsley branch of the Sheffield and South Yorkshire Naviation, we turned about next to Ethel's namesake, **photo 2**. As threatened above, (Promised?) in the **Ground Level Mainline Association**, newsletter, *Turnout 89* (March) Andrew Ward makes a better driving truck, (Disguised as a GCR 15 ton fish van – Geoff) whilst Adrian Morris makes two LMS wagons. GL5 issue 89 (August) sees them putting on a massive display at Locomotion, with Doug Hewson continuing to letter his wagons and Bill Hall painting entire wagons, an article originally published in EiM. Editor, Keith, writes on Danum Gallery Library and Museum in Doncaster. Two locomotives are on show, *Green Arrow,* and Atlantic 251, both built in Doncaster. This is followed by an anonymous article on safe working whilst shunting, possibly an original shed poster. Keith apologises for any reduction in the normally high quality of this issue, but he has been having surgery for prostate cancer. He points out that this is the most common cancer in men, and we all should not hang about in being checked. In Issue 90, (November) Doug Hewson makes, in an extensive article, two Lowfits that, since completion, have suffered at the feet of some heavy-footed person who has damaged the brake gear when stepping over the model, rather than walking round it. I (Geoff) was tempted to refer to said miscreant as a stamping-great booted goon with more boot than brains, but I won't. After all, the bootist would have been unnoticeable among the other enthusiasts attending the event. A further train-working notice is shown, regarding shunting, taken this time from the *British Railways Rule Book* of 1960. These notes apply just as much to miniature railways, as they do to the 'Big Stuff'. Nicola Lock writes on the Great Gathering at Derby, offering her congratulations for a very well-done show. RSME at Gilling have built a coal drop, which has already been used, and is proving a winner. W. www.GL5.org

After attending the MEX in Leamington Spa, Debs and I went to see the Midlands Aviation Museum near Coventry. My impression is that it is not as varied as Elvington or Newark. Most of the exhibits are outside, and only a minimal amount of stuff under cover. It is nevertheless a fascinating place to enjoy. Being near Coventry, of course means that Sir Frank Whittle and the Lutterworth jet story, is prominent, and the Frank Whittle museum is worth a visit on its own. A few pictures form a sample of an article which may appear at a later date, at the editor's discretion. An Avro *Lancaster* bomb sight, (a mechanical computer, M'Lud), **photo 3**, A Westland *Scout* helicopter, and engine, **photo 4**. A Russian MiG 21, Nato code name, *'Fishbed'*, **photo 5**. A Gloster *Javelin*, active in the defence of the realm in the 1950s when I was growing up. I thought they looked a very capable aircraft. The combination of delta wing and t-tail made for a flat landing approach, giving a pilot a good forward view when landing at night or in murky weather, **photo 6**.

Raising Steam, Autumn, from the **Steam Apprentice Club**, Editor, Jim Huntley said the crew has attended a dozen rallies in 2005, with a large presence at Bedford. The 1874 Clayton threshing machine is nearing complUntitled Documentetion of the rebuild, and he is trying to get the steamboat finished in time fot the Bristol Harbour Festival. Chairman Paul Stingmore has enjoyed meeting the menbers during the year, and also noting those who turned up early,

Photo 4: *Scout* helicopter and engine.

Photo 5: USSR MiG 21.

and did the polishing and cleaning… He also noted some of the older apprentices teaching the younger members in their turn. Elliot Jones writes about his day helping with veteran Fowler ploughing engine, The Mistress. He drove it on a lap of the site, which he found exciting particularly the steering wheel, which required turning the opposite way that he wished to go. The Photographic Competions were won by Wesley Goldburn (Under 10)and James Soames (Over 10) The Colouring Competition by Ivy Chamberlain, and the Model Competition by Monty and Bethany Chick. James Morris writes on his Mamod and othe small engines. He spent some time cleaning and polishing his collection, and including 'before' and 'after' photographs. Despite some research, he had been unable to identify the manufacturers of these engines. At the Weeting rally, he helped clean and fire up Century, one of the oldest Burrells, dating from 1877. So old in fact that she does not have a whistle! James Makey had assisted with bringing Clayton and Shuttleworth Old Glory back into steam. W. www.ntet.co.uk

Stockholes Farm Miniature Railway sends the latest newsletter, notable for Ivan in that during a birthday party on 30 August, he found that despite his vantage point on platform 1, he could not see any of the four locos that were out on the track. No, it wasn't foggy! Despite the small site, the layout has been well designed to take advantage of the terrain. Bonfire night was spectacular, as the nature of the flat land all around for miles means that everyone can view everyone else's show. Visiting a brass band competition in the Symphony Hall, Birmingham, means that due to the proximity of the hall to Think Tank, one may dine not only in the company of a Spitfire and a Hurricane, but also a Duchess. Great Central Railway celebration in Sept found Barbara and Ivan in the observation coach, and, conversing with the other passengers, discovered that all six had an interest in model engineering, and all had railways in their gardens! These tracks varied from 7 ¼ to 15-inch gauge. W. www.sfmr.co.uk

Welling and District Model Engineering Society magazine has been received, and only by accident was it caught and read. It narrowly escaped being cast into the outer darkness, consequent upon an 'upgrade' to Gmail.. I see Editor, Tony Riley has decided to retire from the post, and there is not yet a candidate for his replacement. Tony writes, in his final edition, about his recent visit to Ironbridge. He often has a little difficulty when starting a new edition of the magazine, but not this time. He stayed in the Ironmasters House at one end of the bridge and spent time inspecting it and thinking about its construction – no nuts and bolts, all held together with iron pegs much like the contemporary wooden buildings.

Now for something completely different. Deodand, a legal term, was the right to enter a property in order to apprehend a miscreant (I think) an interesting concept. What has this to do with our hobby and interests? Well, the law allowed you, if injured, to be compensated to the value of the those causing the damage, and much legal ingenuity has been expended in proposing how this may be moderated. Hmmm. Perhaps thankfully, this law has been removed from the statute books. This is based on the claims made in the matter of the Sonning Cutting incident in 1841. Another item by Tony Riley on the BR Modernisation plan, included a locomotive powered by Napier Deltic diesel engines. The original design was not proceeded with because Kings Cross did not like high speed diesel engines. A replacement engine was eventually ordered for the East Coast Mainline, and was lighter in weight than the original design. These became the Class 55, named after famous racehorses, the town in which they were built, Doncaster, being famous for both. Tony also found an article on London's First Traffic light (1869). In a further boost to readers' attention, Bob Underwood writes on the Richard Allen paper wheel. A four-foot stack of paper discs was covered with flour paste and held under pressure of 650 tons for three hours then turned on a lathe. Intended to give a smoother ride, they were assembled between two iron discs with twenty-four bolts and tested on the Rutland and Burlington Railroad in the US The response was muted until Geoge Pullman used them for his carriages, whereupon they became more well known, and by 1893, 115,000 had been sold.

And finally, question: When is a retiree's bedtime?

Answer: Two hours after they fall asleep on the couch.


Photo 6: Gloster Javelin all weather interceptor.

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Ultrasonic cleaner, working capacity 10 gallons or 40 litres. Tank holds 19 gallons. Heated tank. It is used and working. Happy to accept offers. Inside of basket in cms, L 50 W 46 H 39 I have used it mainly for cleaning motorcycle parts. Buyer has to pay for the cleaner and then collect it. I am selling the machine due to illness £300. **Tel: 07760272001. Email: jon@thedukes.me.uk. Pocklington, East Yorkshire YO42 1NN.**

8 and 6BA spiral point ground thread 0.0015 inch oversize taps. Pack of 5 new SKF and Dormer brand (one pack each 8BA and 6BA) spiral point 0.0015 inch oversize ground thread HSS taps. These are normally used where the workpiece will be subsequently thermally or chemically treated. They can be picked up in York or posted at the cost of the purchaser. **Email: john.cuckson@hotmail.com. York.**

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Deckel believed to be fp2, Cowells 90 and box of fittings, Pultra lathe with stand, Winfield lathe. Contact for details. Offers. **Email: kath75james75@gmail.com. Notts Leics Derbys.**

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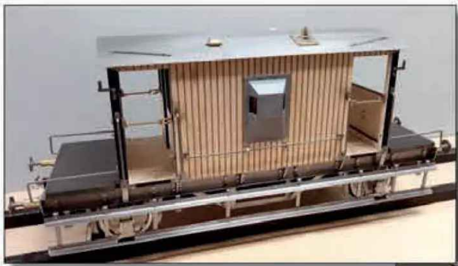

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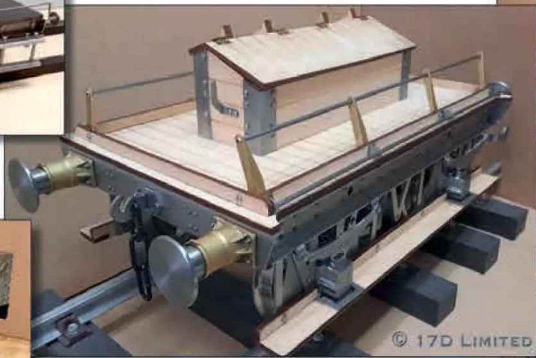

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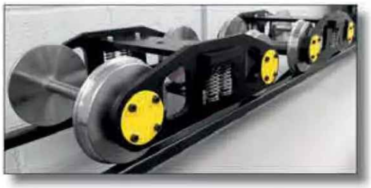

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