

NEWSLETTER October 2021

Hello All, Well that was a quick month! I managed to combine a few events in a round trip at the start of the month. One place I visited was the *Sammy Miller Motorcycle Museum* on the South coast. It was an amazing place and I suffered from information overload. I had a full half day there, and vowed to go back. If you are in the New Forest area and are at all interested, it is well worth visiting. I thought I knew a bit about old British bikes, but I now know how wrong I was.

The Mike Sayers Trophy event was very good. For those who missed it on the night, Nevile has captured it for you to read here. Really, for a relatively small Club, the range of diverse and interesting entries was inspiring. There can only be one winner and this year it was Mel Doran. Congratulations Mel, and thank you to all the entrants who took a lot of time and effort to make it an interesting evening.

I am looking forward to seeing you all at next month's AGM. Please do come along. As I have previously mentioned, we are having a look at the future of PEEMS, and we are interested to know what you think we are doing right or doing wrong, and what you would do to ensure a successful future. If you would prefer to email your ideas, or ring up and tell us, that's fine.

We are still fine tuning 'Zoom' to augment our meetings, so if anyone has suggestions to make it better, or criticism of our techniques let us know. If you are on 'Zoom' and want to speak, try and keep your mouth near to the microphone, or even better, use a headset mic. if you have one.

Stay safe everyone Jonathan.

Club Meeting 6th October ~ Mike Sayers Trophy Evening.

Our Chairman, Jonathan Milner started the meeting by welcoming new guests. Jonathan mentioned that last year, The Mike Sayers Trophy evening was cancelled because of Covid. Many members have said they enjoy the Club meetings because of the social interaction.

- Visits arranged.
 - The Douglas Motorcycle Museum (YO18 7HD). Monday 25th October. Meet 10.50am for 11am start. The museum is in Pickering * and is owned by John Jennison. John has kindly agreed to open up for a special visit by PEEMS. There is ample parking on site, and the gates will be left open for entry. Whilst there will be no charge for entry, John has said if anyone wants to make a contribution, his favoured charity is the MND (Motor Neurone Disease) Association. This will be arranged through Jonathan at PEEMS, not John. We're also trying to arrange a 'bit to eat' together afterwards #. There is the option of 'going downtown', but Nevile Foster has suggested we could take something back to his place if there are still concerns over Covid. If a lot of people turn up, then David Proctor who lives next door has suggested he can take the overflow. Instructions to Nevile's and David's houses will be given on the day. Parking is available there.

* For your information, the location has already been given in the March 2020 Newsletter.

- # Most likely 'Fish 'n Chips'.....
- Sunday 7th November. The visit to The Ellenroad Engine House and Steam Museum was mentioned in last month's newsletter. The museum is on one side of the M62, near Rochdale. We will be using car-share to get there, rather than hiring a coach. The visit will be a few days after next month's AGM, by which time we should know approximately how many members are interested We should also know if the 7th November is a 'Steaming Day'. It is about 1 hour 40 minutes from Pickering so if there is no 'steaming' some members might think "it's a long way to go for nothing".

The link to the museum was given in last month's newsletter, but is also here: <u>https://www.ellenroad.org.uk</u>.

• The Annual General Meeting (AGM) ~ 3rd November. Wednesday Morning At 11am.

The continuity of the Officers of the Club was discussed at the last committee meeting. We invite anyone to volunteer to join the committee, so before the AGM, if you want to join, club rules require you to be proposed and seconded, so it can go through in accordance with the regulations.

Our Treasurer David Hampshire would like to retire, so we are looking for a replacement. He has developed a simple accounting system, and he is more than happy to show anybody who volunteers to take over, how to use it.

The AGM will be held in the main hall on the ground floor of Pickering Memorial Hall, because it is much bigger than 'The Mill Suite'. We want as many people as possible to attend. There will be a 'Pie and Peas' lunch. Having the AGM during the day, makes it better for those who don't like driving at night*.

Zoom links will be given for remote participants.

*Some members have asked why we don't hold all our Club meetings during the day. The problem with this is that some of our speakers run businesses, which would make it difficult for them to come during the day.

• The Workshop Morning.

The next 'Workshop Morning' will be on Tuesday 16th November 10.30am to Noon.

We have a small TIG welder sitting in the workshop which hasn't been used in a while.

It is a SIP Weldbase P178. We're looking for someone with experience of that particular model to:

- i) Mentor anyone who is using it and
- ii) To give the Club tuition.

George Gibbs has said he can't find the original instructions.

• Items For Sale.

- Tony Leeming has informed us that there is a *Smart and Brown 1024* lathe for sale at Market Weighton. It doesn't belong to a Club member, so please contact Tony if you are interested.
- Alastair McLeod has also informed the Club that he has a *Myford Tri-Leva* lathe for sale.
- Jonathan Milner reminded us that he has a Myford MF74 lathe for sale which was advertised in last month's newsletter.

• N.A.M.E. News ~ Stolen Model Locomotives.

Jonathan gave us this piece of news as a warning that we should be vigilant with regard to the security of tools and models.

He had received a note from N.A.M.E (The Northern Association of Model Engineers), about a stolen model locomotive. It was stolen in the Staffordshire area. It's a 5" gauge 2-6-2 GWR 'Prairie' tank locomotive finished in green GWR livery. It was stolen from a Ford Transit parked outside someone's house. A two car, battery electric set, 5" gauge locomotive with blue and silver livery was also stolen alongside a set of tools. This is a reminder that we should all be concerned about our own security with regards to models, tools etc.

• The Mike Sayers Trophy ~ Introduction.

Mike introduced the competition by saying that this was a rather different trophy night to previous ones. The evening was 'an experiment', and he expected some derogatory comments about it.

However, in previous years, people would turn up, and display their models on the tables. The Memorial Hall function rooms are not popular with everyone; some people don't come because they don't like the venue. There are also Covid concerns for everyone, and we have to honour that. We also have 'distant' members who previously haven't been able to participate in the competition. Using photographs (and 'Zoom'), they are now able to.

The size of the models is also important. Before, the ability for models or any engineering to be transported and put on the tables was limited by size. By using photographs, larger entries to the competition can now be included.

Consequent to the new method, we haven't had too many entries for the 2021 Trophy; we have five entries, two (40%) of which are from 'distant' members. Mike was very grateful that they could now participate.

Mike hopes that if we continue like this, people will make the effort to take a couple of photographs of their model, which they can either post or e-mail to Mike. Mike will then use them in the Power Point presentation. Entrants though, will still have to describe their models to the audience.

One of the drawbacks we have, which hasn't been solved yet, is the voting procedure. It has always been a secret vote, where voters enter their first, second and third choices on a form. We haven't worked out yet how people on 'Zoom' can give a secret three choice vote. If anyone knows how to do this, please contact David Proctor.

We could only suggest that people on 'Zoom' whether they have a model or not, don't vote. Fortunately, on the evening, there were sufficient physical voters in the room to make the secret voting viable.

• The Mike Sayers Trophy Competition ~ Entries.

There were five entries for The Mike Sayers Trophy:

• Entry 1 ~ 1903 London Tram built from an 'OcCre Creative Kit'. David Hampshire.

David has already presented this kit at the Club meeting on the 7th October 2020, and there is a description of it in the September/October newsletter. In the presentation on Trophy night a conductor had been added to the crew. This London tram still exists at the tram museum. It is called London County Council (L.C.C.) No.106.



The building of this tram came about because back in 2019, David made a decision not to build any more models. He had already built fifty wagons from scratch, and twelve battery powered engines. He had no more storage space for models. However, after suffering "withdrawal symptoms", he saw this tram advertised in a magazine. He had never built a tram from a kit before. The kit was a static model, but David was sure it could make it work as 'a runner'.



What this picture shows is how *OcCre* build all their models. They are basically built around a 'box'. Building models for the 16mm railway, there is a rule that something should 'look tight' from two metres away. This means that a lot of detail is not necessarily put on the inside of a model.

This tram model is quite different. There are about forty pieces in the 'box' itself. The seats are all slatted. The interior detail is quite complex.

Before it is put together, parts have to be fully or partially painted. David had never done this before. It is quite difficult not to ruin everything by poor detail painting.

The staircase is self-supporting and there is nothing underneath it. Each step has six pieces. It was far more detailed and complicated than anything David had done before. Even the door slides.



This picture shows the top deck. The number of pieces involved in the build can be seen. The tram contains materials David hadn't used before, such as plywood that can be soaked in water and then formed.

When David runs this on his 16mm railway track, he removes the trolley pole, as he doesn't have a gantry. However, in the N.A.M.E. newsletter he saw a picture in an article about the Burton – Ashby light railway which is a tramway which ran from Burton-On-Trent to Ashby-de-da-Zouch (1906 – 1927). One of the trams (no.14) was saved. It went to the United States, and has now returned to the Statfold Barn Railway. It is almost identical to this tram:

http://www.britishtramsonline.co.uk/news/?p=35139



Please press on link. To return to the newsletter click the back arrow at the top left-hand side of the screen.

Tram 14 doesn't have an overhead gantry. Instead, a small diesel engine was put in the bottom, running a generator.

David has done something similar with his model. He has put in two batteries, a gear and a motor. What is amazing is how stable the tram is when running. This is in spite of the fact that the distance between the two axles is less than one third the length of the tram.

Photographs are provided with the kind permission of David Hampshire and must not be reproduced without David's permission

• Entry 2 ~ Full Size Flash Steam Engine, Pumps And Transmission. Paul Windross.

This steam engine has been built for a motor cycle or three-wheeler in order to break the steam powered speed record.

PEEMS is, "as it says on the tin", an experimental engineering as well as a model engineering society, and this entry is an example of the former.

Paul first introduced the fuel and water pumps for this engine at *The Mike Sayers Trophy* evening in July 2018, although they weren't entered into the competition. He also showed the cylinder block at the October 2018 *'Bring and Brag'* (see newsletter).

In December 2018, Paul showed us a photo of the crankshaft on the aligner with some of the other engine parts: At that time, Paul was performing some weight reduction on the piston before working out the balance factor for the crankshaft.

On the June 2019 'Mike Sayers Trophy' evening, Paul entered the fuel and water pumps that he was manufacturing for the engine.

In the October 2019 'Bring and Brag', Paul brought along the assembly of the cylinder block and pumps. The crankshaft was ready to be fitted, it just needed lining up. The barrels and pistons were complete.

In the August 2020 newsletter Paul showed the further progress he had made, namely the manufacture of a countershaft with a much-modified Norton Commando clutch on it.

Unfortunately, Paul was not available on the night to describe the current state of the engine, but the photos below bear testament to the amount of work Paul has put into it since we saw the individual components. This engine has been manufactured in Paul's garage with basic machine tools.



Photographs are provided with the kind permission of Paul Windross and must not be reproduced without Paul's permission

• Entry 3 ~ Brenda 4 ~ A Home Designed 28cc** Overhead Camshaft Flat 4 Petrol Engine. Brian Rees.

Brian has been developing his Brenda 4 over a number of years and PEEMS has been following its progress.

Brian exhibited the engine at the 2018 and 2019 Doncaster shows.

Then in June 2020, Brian introduced the Brenda 4 to PEEMS in the form of specifications and photographs. We heard that the 'Sir Malcolm Campbell' trophy was awarded to this model by the 'Sutton Model Engineering Club' in May 2019. Sir Malcolm was the first President and this is their highest award.

** Recalculated as 28cc (previously described as 24cc).

On the 16th March 2021, PEEMS held a 'Zoom' Workshop, where Brian spoke about the trials and tribulations of building scale model engines. This discussion demonstrated the truth that engineering (model or otherwise) is as much about pre-planning and problem solving as it is about producing a successful fully working final product. There was a question-and-answer session in which Brian went into some detail about the model building process.

All the previous presentations/ demonstrations are presented in that month's PEEMS newsletter.

On the evening, Brian reintroduced Brenda 4 for competition. Brian explained that it had previously been described as a 24cc engine, but further calculations showed it was actually 28cc.

It is 200mm long, 250mm wide, and 220mm high.

It has a compression ratio of 8:1, the fuel is methanol, and it has gear driven cam shafts.



It has been machined from a number of materials, mostly on Brian's *Sherline* lathe. The crankcase couldn't be more than 90mm long.



This photo shows the oil pump fixed to the front timing cover, with all the pipe-work.

Camshaft bearings are under the brass cover plates.



This is the Rear/ Drivers side, with switches for ignition and fans, each with their own volt meters.

There is also a rev counter.

The 90mm flywheel has a hexagon for starting.

The CDI (Capacitor Discharge Ignition) ignition pickups are on the end of each camshaft, together with magnets in the rotors.

This is a close up of the front cover, showing one of the four 40mm square computer fans.

The photo shows the brass drip tray and plastic sheet protection from oil leaks!

Bought items include the CDI units, spark plugs and carburettor.

Photographs are provided with the kind permission of Brian Rees and must not be reproduced without Brian's permission

Questions And Answers.

Q: How many cylinders has it got?

Brian: Four.

Q: Did you have a problem timing the cam shafts? Is it running now?

Brian: No, it's not running at the moment, but it's getting close.

Q: Is that a geared oil pump?

Brian: Yes.

• Entry 4 ~ Dos Amigos, a 1:50 Scale model of an 80ft long 1830 Baltimore Clipper. Stuart Walker.

This model was assembled from a kit of wood and metal parts.

Stuart made a contribution to the February 2021 newsletter where he gave a build progress and brief history of the ship.

In the July 2021 newsletter, Stuart gave more details of the build. To recap:





The hull is a carvel construction using hardwood planks that are shaped, glued and nailed to a plywood framework, which represents the ribs structure of the ship, and are faired to describe the hull shape.

The planks butt up tight to one another, and the ends are bent to shape before they're fixed to the frames.

Tight bends are achieved by soaking the wood in warm water, and steam bending over the hot body of a soldering iron, to gradually form the desired shape.

Nail holes are pre-drilled to avoid splitting the planks. On completion of the planking, all the nail heads are filed off, and the hull finally faired with sandpaper to a smooth fine finish.

A thin plywood deck was bonded to the above framework, which defines the camber profiles and provides a base for bonding the thin deck planks.

The appearance of black caulking between the planks can be achieved by using plastic strips - Stuart used black thread to good effect.

The covering boards (edge planks) forming the junction between the deck and the hull have to be steam bent to follow the ship's profile. The same goes for the capping rail. Both can be laminated or spliced, but it looks better if it's bent. This is best achieved by fixing a plywood former to a flat sheet of thick plywood, and encouraging the bend with a steam flat iron.

The various hatches and the deck housing are fairly straightforward to make. A razor saw and various sanding sticks are used to ensure gap free joints, for finally cleaning up the glued joints, and for smooth finishing the work.

The brass deck cannon supplied in the kit is not supplied with a sliding metal base cradle, the idea being that wood should be used. However, it didn't look right, so Stuart machined a cradle from solid brass and aged the whole thing with chemical brass blacking.

The masts and spars were manufactured from straight dowel stock, and were sanded down to the correct profiles by mounting them in a drill chuck.

As far as possible, all the fittings were added and part assembled on the bench before being permanently mounted on the model. With the hull held securely by the keel in Stuart's bench vice, a guide frame was made and used to achieve the correct rake for drilling the mast holes down into wooden blocks glued into the hull substructure.





The standing rigging is in black, using 0.75, 0.5 and 0.25 mm diameter rope type thread - the smaller being used for ratlines. A mostly 0.5mm diameter natural hemp coloured thread was used for all running rigging, and the 0.25mm diameter was used for the flag halyards. Stuart tried using very fine thread for whipping the looped ends but as it was far too springy, ended up using 0.13mm diameter blackened copper wire.

Similar treated wire, but in 0.5mm diameter soft brass, was used for making the chain plates, eye pins, hooks and binding around the rigging blocks. This was very simply achieved by using small round tapered pliers and callipers to measure the wooden blocks, and then the dimensions transferred with simple pencil marks on the pliers. By using these marks, the thin wire can be precisely bent and fitted around the little wooden blocks. A good tight fit can be achieved, and if it turned out to be a bit slack, an extra twist of the eye end usually made it secure. A small amount of superglue locks it all together.

All the rigging is permanently secured with superglue, and it's useful to coat the ends of the threads that have to pass through the very small holes in pulley blocks with it, which made it much easier to control and guide the threads. It's not a wise move to superglue the rope ends on to the belaying pins until the whole of the rigging is complete. Stuart often found it necessary to relocate and adjust the rigging as the operation progressed.

Stuart used a clear spirit-based shellac sanding sealer to finish all the wood. Some of the spars looked a bit too pale and were toned down with a darker shellac coating.

• Entry 5 ~ An Atkinson Differential Engine. Mel Doran.

This uses a bought flywheel casting, and odd pieces of aluminium, steel and brass.

Mel originally introduced this model to PEEMS at the October 2019 '*Bring and Brag*' evening. At that time the model was still a 'work in progress'. At the August 2020 club meeting, Mel presented his completed model. You can see the model in each of these newsletters.



This model came about two years ago when Mel was showing his Atkinson Cycle Engine PEEMS were at the 2019 Doncaster Show.

Someone came up and said that he hadn't seen an Atkinson Differential at the show. He said that someone had been running one at the Harrogate Show, and it would be nice to see one again.

A thought struck Mel, that he already had a rough sketch plan, with dimensions, that he was going to send to a friend in Australia, who was going to build one. Mike Sayers suggested that Mel should build one for the next show.

Looking at the plans, Mel had very little material to build the model, so he then went around stores picking up bits of aluminium, steel etc.

The only part he had to buy was the flywheel casting which he got from *The Engineers Emporium*. If you want a flywheel, they have half a dozen various flywheels to sell you.

This flywheel is 9 inches in diameter and weighs about 9 lbs.

The yellow arms are 6mm thick sheet steel. The horizontal cylinder is cast iron which has been bored out and honed. The rest is aluminium.

The body of the engine is 6mm aluminium plate, bolted together and sealed. This contains the cooling water.

There is a 'crankshaft' from the flywheel to the disk you can see in the middle. The crank is actually a pin on the disk which connects to each arm by a short link. The flywheel rotates clockwise.

The pin, via the link moves each arm and hence the pistons. Both pistons do the same thing, but one is timed just behind the other. The piston action is: slowly moves forward, then accelerates, then slowly comes to a stop. Both pistons do that working at different rates. They are not like the opposed pistons in a *Boxer* engine ** where they work together. (** A Boxer engine is a flat engine where the cylinders are located each side of a central crankshaft. The pistons of each of the opposed pair of cylinders move inwards and outwards at the same time)

There is an animation at this website: https://en.wikipedia.org/wiki/Atkinson cycle



To return to the newsletter please click the back arrow at the top left hand of the screen

The fuel mixer and exhaust are both at the same end. They are connected to the cylinder via poppet valves, which are atmospheric with a very light spring on them. The ignition is by means of a spark plug.

The left hand 'pump' piston moves away from the right hand 'working' piston. It moves away faster than the 'working' piston which moves very slowly. The 'pump' piston draws the fuel into the cylinder. It then slows down as it reaches the left-hand end of the cylinder. The 'working' piston then accelerates. When both cylinders are at the left-hand end there is about a 5" gap between the faces, and the fuel gas is then compressed into that. The spark then occurs.

The expanding gases push the 'working' piston down the cylinder powering the flywheel.

It is followed by the 'pump' piston which scours out the exhaust gases. The whole cycle works in one revolution of the flywheel.

The ignition is via a 12-volt coil off a car.



Here is the Fly Ball regulator to control the speed of the engine. It is mounted on the crankshaft. It operates through a lever, and behind that is a microswitch. The way the regulator controls the engine speed is by switching off the current to the spark plug. As soon as the speed dies down, the spark is returned.

Mel hasn't seen anything like that before.

There are two grease points for the crankshaft at A and B. All the joints are drilled and can be lubricated.

The whole engine had to be built very accurately dimensionally. The distances between pivot points and piston connections had to be very accurate for the engine to work.



The way the engine gets its fuel is by the fuel being drawn in by the 'pump' piston. The unit in the top of the tank has a one-way valve at the bottom of the tank, emersed in fuel, so that there is always fuel at the fuel mixer, otherwise it will stop. That is one problem that can occur when there is dirt in the tank.

The muffler/silencer silences the engine a little bit.

The engine works quite well but has yet to be shown at an exhibition.

Questions And Answers.

- Q: What fuel does it run on?
- Mel: Petrol. I put a few drops of oil in with it. I have found it difficult to get lubrication into the cylinder. In photo 3 above, you can see a lubricator that I picked up from an auto-jumble sale, but it doesn't work properly. The problem I'm finding is that I'm getting back pressures wherever I place it. The lubricator is still on there but I don't use it.
- **Q:** I understand how the automatic inlet works, but I'm not clear about the exhaust. Is that just opening against pressure?
- **Mel:** With the exhaust gases coming down the cylinder, you have to port it so that as the gas comes down the stem, it pushes the poppet valve off its seat face from the inside. When the 'pump' piston draws fuel in, the exhaust valve is sucked down onto its seat face and the inlet valve is lifted.

It was something that puzzled me for some time. However, it is a very simple engine, but in order for it to operate, it has to be very accurate dimensionally.

- Q: Is this a scale model of a full-size Atkinson Differential Engine?
- **Mel:** This is a model which runs on the principle of the Atkinson Cycle. This is not a scale model of an actual full-size engine, and I'm not sure if there was ever a full-size version of this model.

Voting:

The members present voted for their first, second and third preferences in a secret ballot, and after totalling up the votes this was the final result:

- Mike Sayers Trophy* Mel Doran.
- Second Prize (£20) Brian Rees.
- Third Prize (£10) Paul Windross.

*In addition, there was a £35 award.

Mike Sayers expressed the view that all the entries were of a very high standard.



• A Scratch Built Steam Turbine For A Model Steam Boat. ~ John Heeley

After the Mike Sayers Trophy, John Heeley presented his scratch-built steam turbine. He was still working on it at three o'clock of the afternoon of the Club meeting. It had been manufactured over the three days since the previous Sunday, and is really just an experiment.



i) The Background.

John has spent most of the summer running radio-controlled steam boats on the pond belonging to *Huddersfield Model Engineers*. Over the course of the year, they steadily became faster and more reliable. John had come to the point he had gone as far as he could with his three boats.

Then he received a copy of *Model Engineer Magazine* (24th September – 7th October) which had a picture of a small turbine on the front cover, and this sparked his interest. The one on the front cover was based on castings which John doesn't use. On the Sunday afternoon John started searching for materials. The previous photos show the result after three days work.

This is a single stage 'Stumpf Wheel' which is a plane aluminium wheel, with 'buckets' machined into the periphery, mounted on a shaft. It is very strong and solid. John could imagine revving this to extremely high revs without breaking it. This is the reason it is mounted in, basically, a 'tin can'. If these were the blades that John normally has in his jet turbines, he would have a more substantial casing.

ii) The Basic Structure.

• The Bearing Housing.

At the back of the turbine is the bearing housing. This contains two ball races, one at each end. It is a 'press fit' into the backplate, which is a circular piece of aluminium 10mm thick. There is some *Loctite* in there to prevent 'galling'. John loves 'press fits' and for that he uses his press. The ball races are a light 'press fit' into each end of the housing with the shields taken off inside.

The fitting on top of the housing is for lubrication. John discovered that the lubricant needs to be remarkably thin. The revs dropped while a lot when John put in a 50% paraffin/oil mix, rather than say *WD40*. Unfortunately, *Loctite* doesn't like *WD40*.

There is a gearwheel on the end, taken out of an electric drill.

There will be a gear train running out at an angle of three or four to one, and the axle drive shaft will come out at one side.

• The Wheel Housing.

The wheel is a 'press fit' onto a 9½mm diameter shaft. The shaft is a stainless-steel door handle off a kitchen unit. Close inspection of the housing reveals where various holes have been filled. The wheel was 'press fitted' onto the shaft with a nut. Most of the nut has been machined away.

Whilst making the wheel housing, John discovered that the air-gun pellet tin he was using to hold the various parts, was the right size to fit over the rotor.

John put the exhaust in at the bottom of the housing because the turbine will become water-logged. There is also a hole at the bottom to help with drainage.

At 10 o'clock is the adjustable inlet pipe. This allows the inlet to be adjusted angularly so that the jet can hit the buckets at the most efficient angle.

iii) Running.

Although John has a digital rev-counter, which can be attached to the turbine, he hasn't yet had time to run any rpm tests. The only solid information is that if 60psi is put into the inlet pipe (from John's big compressor), the jet is 40 thou (1mm) in diameter. John thinks it needs to go smaller.

The noise was so great John reached for his ear defenders; it was screaming. He held it in his hand and there was no vibration at all.

The rotor has been balanced with a dimple in it. John knows the buckets are out by about 3.5 thou, so originally the rotor wasn't dynamically balanced. By putting in the dimple, and checking the rotor on knife edges, John knows it's now in balance.

iv) Future Work.

The next job is to make the gear train, and see if there is any chance of it working in a steam boat hull. As stated above, the gearwheel in the model has been taken from an electric drill, and may only be used as a pattern for the pitch. John has an individual way of making gears, which involves 'fly cutting', or as John calls it 'cog chomping'. A gear case will be made with a cover so that oil can be squirted in, along with a drive shaft.

So long as a boiler can be provided which gives a continuous 60psi (a marine engine runs at continuous speed), then John will be onto a winner.

The size of the jet, as said before, needs to be reduced, probably to the 'legendary' No. 80 (about 0.34mm = 13.5 thou) as used in blower jets in model steam locos. No. 80 is the smallest one available commercially, from for example, *Blackgates*.

So, this is all experimental, and is based on the turbine in *Model Engineer* (the second part came that day). The turbine in *Model Engineer* uses a 1mm jet, so John thought that maybe he's 'in the game'. But in the end, it all comes down to boiler size.

Questions and Answers.

- **Q:** The gearbox will have to drive the prop shaft very slowly, won't it?
- **John:** Yes. I'm aiming for a 4:1 reduction (or maybe 3:1). The gear wheel in the turbine is about ½" diameter, so I'm looking at a 2" diameter gear sitting off at an angle. There will be an oval shaped housing press fitted onto the turbine bearing housing. 'Press-fitted' behind that will be another housing which will contain two ball races for the propeller drive shaft. I'll see if I can give it enough steam to make it work. There is a lot of speed in the turbine which has to be converted into torque.
- **Q:** The turbine will be in the thousands of revs/min, whilst the propeller will need to be in the hundreds of revs/min, won't it?
- John: Well, it depends on the pitch of the propeller. The steam engines I've been running in the radio-controlled world of steam boats work at quite low speed, and they're high torque. At the moment this turbine is high speed and low torque. If it goes in a hull and moves a boat on the Huddersfield pond, that will count as a success. That will be the place to start the development. I can then have a year developing turbines. If it doesn't work at all, there will be no incentive to continue.
- **Q:** Paul Windross spent time developing a model marine turbine, didn't he?
- **John:** Yes. Paul came to the conclusion that on his racing hydroplane, the turbine wasn't going to be as good as the reciprocating engine when it came to breaking speed records. As I've said, if the turbine moves the boat, it will be good, but I'm not expecting it to be as good as the steam engine, and certainly nowhere near as efficient. The reciprocating engines run on 25psi and I'm getting decent speeds off them now after a lot of development.

I've got four boilers, one of which is too small. The other three have been hydraulically tested to in excess of 150psi. All the boiler certificates have been set up for 25psi as have the safety valves. I'll have to get the boiler inspector to uprate the boiler. It will probably need another hydraulic test to run it at 60psi.

Theoretically the circumferential speed of the turbine wheel should be exactly half the speed of steam flow from the jet.

- **Q:** What do you heat the boiler with?
- **John:** They're all designed to be heated with methylated spirits in an oval throat lozenge tin with some gauze over the top of some wadding. I've done some experiments over the last few weeks with some *Mamod* fuel pellets. They work perfectly well, but the fire is slightly smaller, but they do run for longer.

I was told that supermarket firelighters are the same as *Mamod* fuel pellets. They are not! They smell of paraffin, you get a low flame and a lot of black soot!

- Q: If this a success, could you fit a throttle valve?
- John: Probably at some stage. The boats I'm running now are run rudder only, because the engines are not self starting. I have a 'kipper box' designed to look like a fish box, and it contains a radio unit, battery and servo which sticks out of the top of it. This can be put in each of the three boats and the tiller is connected to it. It can be swapped in position in three or four minutes.

It will probably need a throttle valve in order to balance the steam production with the steam use. I may need to find the happy medium where it's going to maintain the pressure.

With this size jet (1mm, and it's a converging nozzle), and with this bucket size on the rotor, it likes about 60psi, which is the optimum at the moment. I still haven't measured the revs, but I will work that out.

Further Items For Sale.

- Two bound volumes of 'The Model Engineer and Electrician' Magazine.
 - i) Volume 1 (1903) Binder In Good Condition.
 - ii) Volume 2 (1917) Binder Damaged.
 - £6 For Club Funds.

If you are interested, please contact Ken Hillier. Contact details are in the Members List.

• John Nesom has a scrap non-working *Black and Decker D500* for demonstration purposes only. If you are interested, please contact John. Contact details are in the Members List.



