NEWSLETTER October 2017

i) COMMENTS

- **The Clock Focus Group**.

John Powell said that the clock the focus group are building will eventually belong to PEEMS. Members can build parts at home, but it would be preferable if the PEEMS workshop is used because advice can be given there. Members will each need to decide which components they want to manufacture. Obviously, there is a number of people with the expertise to help, and all members of the group will be involved in the build.

- **The Workshop**.

Eric Foot (safety officer) has made a protoype guard for the grinder, so that safety issue is now covered. A request was made in the last issue of the newsletter for a "Pistol" drill, and the workshop now has one.
One safety issue with the Myford lathe was that there was no provision for chuck protection in the event of a power outage. For example, if the power came back on suddenly and a key was still in the chuck this could be dangerous.
The Myford now has an emergency switch.
This switch includes a relay which prevents restart when the power returns.
Restart is only possible when the operator decides.

- **The Railway**

Once again PEEMS acknowledges the great job done by Peter Bramley. PEEMS has decided that the railway will run for another year before a review is taken on its continuance. Whilst the opinion was that this year the railway attended too many events, with some disappointments, a few events were excellent. These included Welburn Hall School, a community outreach, and the Ryedale and Malton shows which were excellent. Malton show was good because the Young Farmers provided the "heavy lift". PEEMS has decided that for 2018 we should concentrate only on those events that we think are the best.

ii) FORTHCOMING EVENTS

- **Club Meeting. Wednesday 1st November. Annual General Meeting.**
  There will be a pie and peas supper provided along with tea and coffee.
  Note: A Nomination Form for Membership of the PEEMS Committee 2017/2018 has been sent out seperately, at the same time as this newsletter.

- **Workshop Morning. Tuesday 21st November 10am to 12 noon.**

- **Excursion to the National Railway Museum In York. Wednesday 25th October at 10.30am**.
  This will be an organised tour of the museum's workshops. After the visit, members are free to visit the rest of the museum. Individuals need to organise their own transport to the venue, either by car sharing, travel by bus or by train.
  We are to meet at the entrance to the Loco Hall at 10.30am where we will be met by Mel Doran.

- **Club Meeting Wednesday 6th December:** "Clock Wheel Making" a talk by Richard Gretton.

- **A Visit To JCB** in Rocester (nr. Uttoxeter, Staffordshire).
  As mentioned in the previous newsletter, a visit was proposed to JCB's World Headquarters Visitor's centre.
  We now have a firm date for the visit of **Tuesday 12th December**.
  There is a charge of £30/person, for both the visit and a lunch, which we have been told is excellent.
  There appears to be sufficient people (including guests) to hire a bus, for which there will be an extra charge.

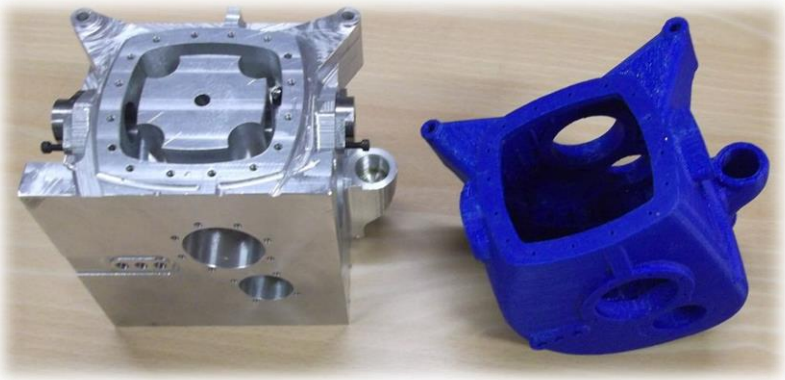
iii) CLUB MEETING. Wednesday 4thOctober ~ 'Bring And Brag'.

There were thirteen exhibitors at the 'Bring and Brag' meeting:

a) Mike Sayers ~ Scale Model Bentley Engine Gearbox Parts.

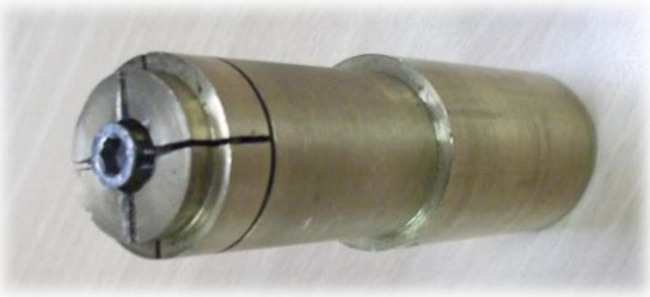
Mike is building a gearbox for his scale model Bentley engine gear box and he brought in some parts and the tooling used in the manufacturing process. The items of interest included a rev-counter drive. The drive included two bevel gears meshed at 36°. This involved a 64 DP gear cutter, and jigs to hold the parts.

Mike also brought in a 3D printed plastic representation of the gearbox housing (printed by his son-in-law), used as a template for the aluminium housing which Mike is attempting to machine.



b) Mel Doran ~ Spring Chuck

Mel explained that during his apprenticeship, he and his fellow apprentices made spring chucks. These chucks are invaluable for precision work especially when machining the outside of cylinders ensuring that there is high tolerance concentricity between in the inner and outer surfaces. The chuck holds the bore exactly (the Allen key is screwed in so the chuck expands in the bore) providing the grip required for the machining operation.



c) Tony Leeming ~ Double Roller Filing Rest For Lathe Work

Tony brought in a simple filing rest that he had manufactured. The design was by “Ned” (Edward Westbury) and was from the ‘Model Engineer’. The rest allows adjustments to within one thou and there is a screw lock. The lead screw was the first screw cutting Tony had done on his lathe.

Filing rests are useful for filing squares or hexagons on a piece of work in a lathe. Use of a file rest means that a milling machine is not required for the process, and are handy for creating, for example ‘D’ bits and winding squares on clock spindles. A double roller filing rest consists of two hardened steel rollers. These can be mounted on a lathe so that they are adjacent to or straddle the component mounted in a holding device attached to the mandrel. The rollers can be varied in height, and by careful adjustment, it is possible to create a flat with a file to a high tolerance. By indexing the lathe mandrel a series of flats can be produced. The accuracy and flatness the rest provides is made possible because the file ceases to cut when it contacts both rollers.

Reference: The Journal of The Society of Model & Experimental Engineers - December 2014 | Vol. 22 | No. 6

d) Eric Foot ~ Apparatus For Laser Scanning Objects In Order To 3D Print Copies.

The apparatus that Eric set up featured a jug on a turntable. Whilst the jug rotated very slowly, it was scanned by a laser line (actually 2 lasers ~ see explanation on the next page), so that the three 3D image could be stored digitally on a laptop. This 3D digital data could then be downloaded to a 3D printer, and the object printed in plastic. In addition to scanning the outside of the object, the inside can be scanned too. The accuracy is within 2.5 thou. Eric suggested that PEEMS should start 3D printing objects.

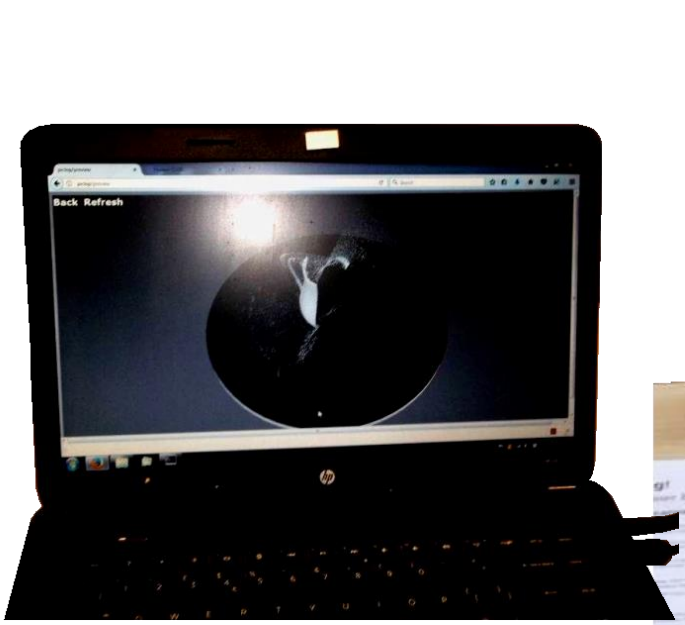


Image Of Jug On Laptop As It Is Being Scanned

Eric's Explanation Of The Piclop Laser Scanner:

A 3D scanner attempts to scan a 3D object and produce a representation which can then be 3D printed. The goal is to produce a 3D copier- such that one may produce a plastic copy of any original part within the size constraints of the machine.

Piclop is a published design. I downloaded the designs for the plastic parts and printed them using my own 3D printer, which I constructed from a £120 kit I found on e-bay. Apart from that, I used:

- 2 x 8mm screwed rods from Yates
- A Raspberry Pi-3 single-board computer, together with a picam 1.3 camera module. A £10 Pi-0 computer would have done just as well: I didn't have one to hand.
- A stepper motor, salvaged from an old ink jet printer.
- A ball bearing. The published design uses a £25 16014 bearing, which I thought excessive. I 3D printed the case for mine, and filled it with catapult ammunition "balls".
- An electronic control board, which I designed and built myself to suit my salvaged stepper motor
- Assorted nuts and bolts.

So what does it do? It operates under the control on the single board computer, the interface being accessed via a wireless link. The object to be copied is placed on the turntable. The sequence then is:

- Take a picture of the object.
- Switch on a line laser.
- Take a second picture of the object.
- Subtract the first picture from the second to find the difference made by the laser. This shows as a wavy line, which is used to calculate the positions on the object which were illuminated by the laser. From that, their positions relative to the centre of the turntable are calculated.
- Revolve the turn table by a fraction of a degree, and repeat until the whole object has been scanned.

Astute observers will note that there actually two lasers on the scanner. When scanning irregular objects, it is possible for a part of the object not being scanned to obstruct the camera view of the part which is being scanned. The second laser allows Piclop a second chance to capture these points. Its use is optional.
This is very much a work in progress. 3D scanners do not work very well, and although they are improving, their design is quite poor. The plastic parts are designed for appearance and are not particularly practical. They are very hard to print well. Most 3D printers work by printing one layer on top the previous layer.
They are not very good at arches, which involve printing on nothing!
The software is virtually unusable. The delay between doing something and seeing it on the screen makes adjustment extremely difficult.
I am in the process of redesigning the software to provide me with hours of fun during the dark winter evenings.
At some stage, I may well redesign the plastic structure in order to:

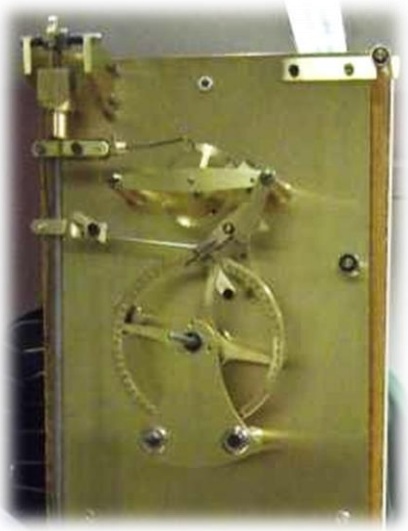
- Make it easier to print.
- Use a budget geared motor rather than the current Nema 17 and driver unit.
- Accommodate the budget Pi-0 rather the Pi-3 single-board computer.
- Improve the camera focusing and aiming mechanism.

e) Peter Bramley ~ Manufacture Of Gearing To Speed Up A Milling Machine For Model Engineering.

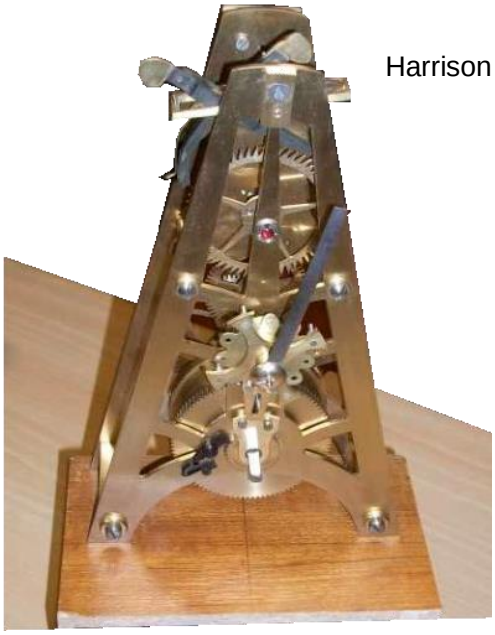
Peter has a large heavy milling machine which is not fast enough for model engineering. It was therefore necessary to manufacture gearing to speed it up. The milling machine is horizontal with a vertical head. Because of the inaccuracy of his digital callipers, the gears he's made had to be done twice. Ball races have been incorporated into the 5/8" R8 collet because of the required speeds.
All thrust is transmitted from the bottom plate through the machine.
The speed of the machine has been increased by a factor of three resulting in 3000 revs/minute.
This has resulted in plenty of swarf!!

f) John Powell ~ Gearless Clock

Regarding clock projects, John had asked himself the question, whether it was better to repair clocks or to make them. There are so many types of clocks and some are very complicated. It is therefore expedient, when building a clock, to keep it simple.
John brought in a “gearless clock” he was working on. The design was by John Wilding in “The Horological Magazine”, and was based on “Dr Woodward’s Gearless Clock”. The beauty of this design was that there was a small number of parts. John’s clock had taken two weeks of work thus far. The clock counts in half minutes with the weight of the pendulum setting off the next escarpment. John also brought in a “Harrison” clock for inspection.



Gearless Clock



Harrison Clock

g) Ron Baier ~ Clock Repair

Ron showed us a German clock with a Vienna regulator. Ron has taken it to pieces in order to fix it.

h) David Hampshire ~ Quarryman's Coach and Slate Trolley For 16mm Garden Railway

David's nine year old grandson wanted to build his own 16mm railway. What David had on display was a kit of a quarryman's coach that his grandson had built. In addition, his grandson designed and built a slate trolley which incorporated redundant 16mm gauge sleepers that were in storage. The models are based on rolling stock used on Welsh railways which ran on 2 ft narrow 'O' gauge track. The model is 16mm/ft scale.

i) John Heeley ~ Steam Engine For A 'Windermere Launch'

John decided to build a steam engine for a model Windermere launch rather than having an electric motor. It took four hours to build the boiler and four hours to build the engine. It then took four hours to get the engine running on compressed air. This particular model is a good one for beginners with guaranteed success. The engine was made using the machine tools in John's workshop. The boiler is 3" long and 3" diameter, and was manufactured using 3/32" thick copper tube. The boiler has a volume of 300cc.
The engine raises steam in six minutes and runs for seventeen minutes. The boiler has been tested at 60psi, is certificated at 30psi, and runs at 12.5psi.
Heat for the boiler is provided by a lamp in a tin containing methylated spirits, with a gauze on top. The lamp burns for 30 minutes. John has made provision for a water gauge on one side.
The launch itself is wooden with planks fastened to frames forming the hull. It is controlled using a single channel radio. The engine doesn't self-start but the intention is to start the engine eventually by rotating the flywheel.

j) Colin Bainbridge ~ Tool Holder For A Lathe

This holder allows the tool to swing clear of the fixture and is a design by Martin Cleave in 'Model Engineer'. The tool holder hinges back, so indexing can be maintained throughout processes which encompass turning, milling, etc. The tool holder started as a lump of mild steel from the base of an angle poise lamp, and is held together with cap head screws.

k) Ted Fletcher ~ Some Tooling Ted Manufactured And An Innovative Method For Counting Starter Motor Coil Windings And Unwindings

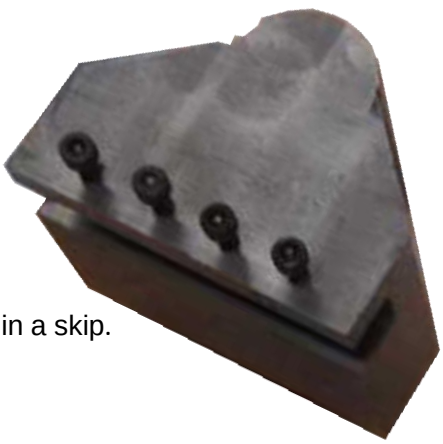
i) Rotary Table Attachment

When fixed to my rotary table, a Myford type screw chuck can be screwed on

ii) Rotary Table Tail Stock ~ Useful when cutting gears.

iii)Tailstock Turning Attachment

iv) Gibraltar Lathe Tool Holder For Heavy Cuts.
Remove the cross slide and the Gibraltar tool post fits directly in its place.
Ideal for heavy or interrupted cuts.
The tool holder was made from scrap cast iron found in a skip.



v) Rotating Tail Stock Chuck Attachment

Sometime ago I was asked to skim the commutator of a badly worn car starter motor armature. The diameter of the armature was too big to fit in the lathe's chuck, and often the outer is not concentric with the armature shaft anyway. Armatures should always be run between centres when having their commutators skimmed to maintain concentricity, otherwise you get 'brush bounce'. 'Brush bounce' causes sparking at the brushes, which in turn causes burning of the commutator, overheating of the windings and premature armature failure. Only one end of the armature shaft was centred, so I was unable to run the armature between centres. I tried to run the armature in the fixed steady, again it was too big. I knew years ago that Boxford made an attachment which enabled a chuck to be mounted in the tailstock of a lathe for similar situations. So, I copied the idea.

Not often used but handy to have available

vi) An Arrangement For Winding Or Unwinding Coils

The plate with the small rotating centre is bolted to the milling machine table. In the M111 quill, there is another rotating centre. A coil of insulated wire is mounted between the two centres and is free to rotate with a small amount of controlled friction, otherwise the wire becomes a tangled mess as it is spooled off. When winding coils, you need to know how many turns you are putting onto a coil former. Actually, it is not particularly essential on coils such as motor starter coils. (amp/turns). Better to get it correct first time. The coil former is mounted on a simple mandrel in the lathe and as second hand wire is removed from the mill, it's rewound by the lathe on a very slow speed, and the number of turns counted as follows.

The shaped block of wood in which a small reed switch is embedded, fits between the bed of my lathe. In the periphery of the ring of insulating material is a small magnet, the ring clamps on the outside of the lathe chuck. As the chuck rotates, it opens and closes the reed switch (Binary 0 or 1), the output of which is fed to the modified calculator. This counts the turns of the coil on the lathe.

I took the calculator to pieces, fitted a 3.5mm socket in which the reed switch's 3.5mm plug fits. Then I very carefully cut the plastic track which is inside the calculator, and soldered two wires to the plastic printed circuit. This has been very useful over the years. Much more reliable than a mechanical counter setup that I had.

To increment, press 'Power On', press 1+1 = and every time the switch closes the display adds one.

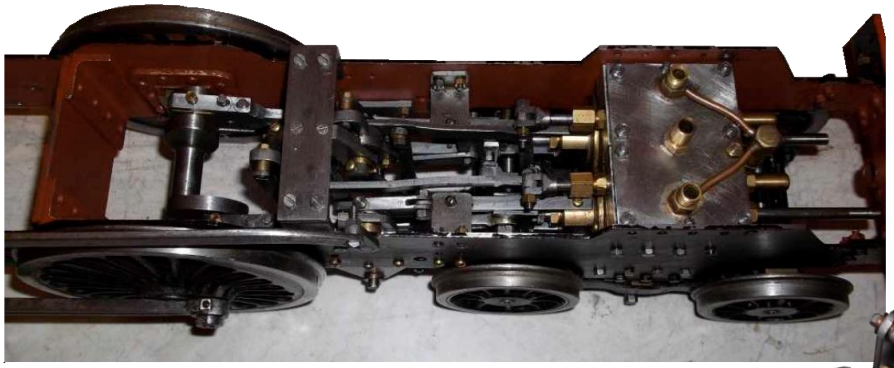
To decrement, press 'Power On', insert Total, maybe 1000 – 1 = and every time the switch closes it counts down 999, 998 etc.

l) Chris Irvine ~ A Hobson Injection Carburettor.

The carburettor on display was a Hobson Injection Carburettor. Whilst it was designed in the 1940s, this carburettor was still in service up to the 1990s. France's Snecma was an example of a company still using it up to that time.
It was used in the Bristol Hercules radial engines, and is still flying in the Bristol Freighter in Canada.
During the Battle Of Britain, Spitfires were severely disadvantaged against the German fighters during aerobatics, as negative G caused fuel starvation and positive G caused the carburettors to float up and the engines swamped with fuel. This did not happen to the German fighters as their engines were fuel injected.
A solution needed to be found for this problem
The solution to the problem was the Hobson carburettor, where to keep the engine running when inverted, fuel is injected into a venturi. There is also a Bourdon Tube to make sure the fuel mix is correct at various temperatures. In later Rolls Royce Merlin engines fuel was injected directly into the eye of the supercharger.
The Hobson carburettor deals with 100 gallons/hr and is 39 Litres whereas the Merlin carburettor is 27 litres.

m) Nevile Foster ~ Midland Railway Class 990 'Deeley' 4P Locomotive Build

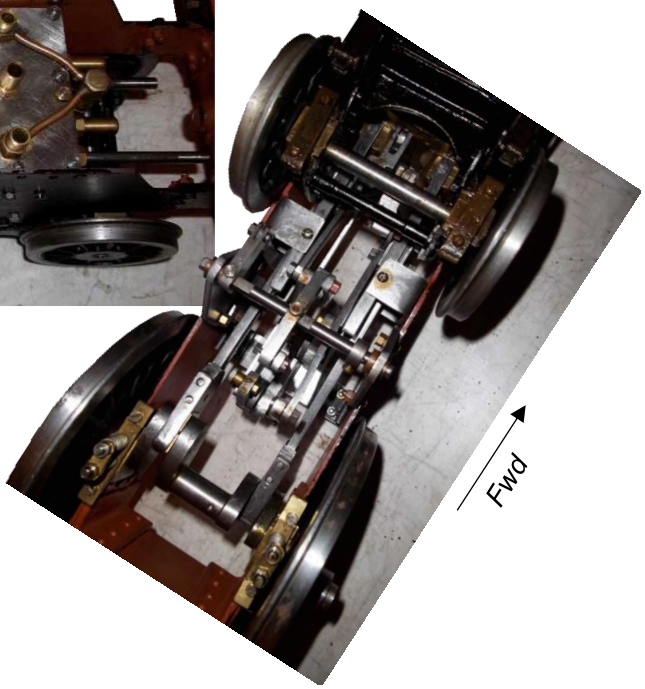
The Deeley valve gear is now assembled onto the valve rods and the steam piston crossheads, and links to the reverse lever actuated by the reach rod. The chassis rolls without any fouls. The next stage is to set up the valves so that the locomotive can run on compressed air.



Fwd ⟶

Top View

Bottom View



Newcomen Society ~ Reminder

In the PEEMS September Newsletter, a programme was included, of talks and visits by the Newcomen Society (South Yorkshire).They have sent a reminder of the following talk:

Just a brief reminder that our next meeting is on Monday 23rd October when Stephen Carter will be speaking on:-

Scraping the Barrel: From bang to blast - the metallurgy of bullets, shells & barrels

The development of firearms has been dependent upon advances in metallurgy and materials science in order to ensure that a projectile can be delivered, safely, reliably, repeatedly and accurately to a target which may be many miles away. Stephen's talk considers the service environment of a gun barrel, the temperatures, pressures and other factors which govern it's ability to perform, and considers how different approaches have led us to the current state of the art.

Society meetings are held at Kelham Island Industrial Museum, Alma Street, Sheffield starting at 6:30pm. Tea and coffee will be available from 6:00pm and we look forward to welcoming you to what we hope will be an interesting talk and discussion.

Meetings are free and open to all and there is no need to book seats in advance, however, if you will be attending as a group and wish to sit together please let me know and I will reserve a block of seats for you.

John Suter, Meeting Secretary, Newcomen Society South Yorkshire.

Travel Directions:

For directions to Kelham Island Museum please visit:- http://www.simt.co.uk/find-us
For further information please contact John Suter on:- meetings.syorks@newcomen.com

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