NEWSLETTER February 2020

FORTHCOMING EVENTS

March

Club Meeting: Wednesday 4th March **- Formulate Model Lists For The Doncaster Show and Discussion On Stewarding**

Farmers' Breakfast : Thursday 5th March **PEEMS to give a talk at the 'Farmers' Breakfast', Amotherby.**

Club Annual Dinner At Mickle Hill: Saturday 14th March Meeting 6.30 – 7.00pm in the bar for 7pm start.
See next page for details.

Workshop Morning: Tuesday 17th March 10-12 noon.

April

Club Meeting: Wednesday 1st April ~ **Tony Simons will talk about the Clayton Steam Wagon**.

Visit To The *Douglas* Motorcycle Museum In The Old *MAFF* Building in Pickering. Saturday April 4th 10-11am

Workshop Morning: Tuesday 18th February 10-12 noon.

Club Meeting : Wednesday 5th February ~ **A Talk By Paul Middleton (NYMR) About The Restoration Of His 'Lucie' Brussels Steam Tram.**

There was a good turnout for the meeting with a number of guests in attendance.
Our Chairman, Jonathan Milner called the meeting to order and started with the usual housekeeping and other announcements:

- **New Location For PEEMS Meetings Starting April 1st**

  The RVS building is closing at the end of March. PEEMS meetings will be held in 'The Memorial Hall' Pickering from April 1st onwards. Parking can be found at '*The Ropery'* car park which is free after 6 pm, or outside the Memorial Hall and up Potter Hill. Parking outside the 'Memorial Hall' can be variable depending on what else is on in the locality.
  PEEMS will be meeting in '*The Mill Suite'* on the 3rd floor which is serviced by a lift. The *'Mill Suite'* should be adequate for the majority of meetings, and has a kitchenette and a toilet.
  PEEMS can also use *'The Main Hall'* when required for larger meetings, when large items of engineering are displayed, or when more catering is required (eg. The AGM). *'The Main Hall'* is on the ground floor and comes with a large kitchen and toilets.
  The price of *'The Mill Suite'* is a couple of pounds cheaper that what we are paying for The RVS building, and the price for *'The Main Hall'* a couple of pounds more expensive. So if PEEMS uses *'The Main Hall'*, say three times a year, the annual rent should be about the same as now.

- **The Farmers' Breakfast:** Thursday 5th March at 10am at Amotherby Village Hall YO17 6TG

  As previously announced, PEEMS has been invited to give a talk to *The Farmers Breakfast* (TFB) which is a contact group for senior/retired farmers in the area. They meet monthly in Amotherby. The coordinator for TFB has approached PEEMS to give a talk. This will be quite a big event, as TFB tends to be around forty to forty-five people.
  The Village Hall is on the B1257, the Malton to Hovingham road, on the left at the crossroads, (if travelling from Malton), where you would turn right down to Amotherby. Someone will be on site from 9am . Any members who would like to attend and show, please get in touch with Jonathan.

- **PEEMS Annual Dinner At Mickle Hill Retirement Village.** Saturday 14th March

  Meeting at 6.30 - 7.00 pm in the bar for a 7pm start in the restaurant

  We had a good annual dinner at *Mickle Hill* last year, so PEEMS will be returning this year.

  The menus is shown below, and will be £22 per person (which includes gratuities).

  Please let Jonathan know by the next club meeting (4th March) at the very latest :

  - If you are bringing a guest.
  - The menu choice for you and your guest.

  Please Note: Payments need to be received as soon as possible, the latest date being the next Club Meeting.on the 4th March.

  Cheques are to be made out to **PEEMS.**

  Please also note that there will be a raffle. Please e-mail Brian at maygs80@gmail.com if you have any prizes to donate.

Bread Basket

Starters

Woodland Mushroom Soup.

Pressing Of Ham Hock Terrine, served with Caramelised Onion and Apple Relish.

Smoked Salmon, Crème Fresh, Pickled Cucumber, Dressed Leaves.

Main Dishes

Braised Beef, served with Home Made Hand Cut Chips, Roast Tomato, Buttered Greens, finished with a Traditional Stock Gravy and Home Made Beer Battered Onion Rings.

Deep Filled Ham and Mushroom Pie, served with Mash, Battered Parsnip and Traditional Stock Gravy

Salmon and Prawn Combo, served with Creamy Spinach Sauce and Mashed Potato.

Roasted Aubergine served with Vegetable Rice, Tomato Provencale.

All meals are served with a side of vegetables.

Desserts

Shot of Fentimans Victorian Lemonade*

"The Amazing Tasting Plate" ~ All Your Favourites On One Plate

Mini B&B Pudding Custard, Mini Lemon Drizzle, Mini Sticky Toffee, and Mini Pavlova

Coffee or Tea and Petit Fours

The price includes breads at the table, amazing courses, tasting plate, dessert drink, tea/coffee and petit fours.

- **Doncaster Show In May.**

  If anyone is thinking of exhibiting at the Doncaster Show, please let David Proctor know.

- **‘Boxford’ Lathe**

  There is a small ‘Boxford’ lathe for sale in Pickering. It’s a training model without carriage and screw cutting facilities. Please contact Jonathan Milner if you are interested.

- ‘**Smart and Brown’ Model ‘M’ Lathe.**

  Jonathan is looking for some change wheel gears for a ‘Smart and Brown’ Model M lathe. If you have, or know someone who has these components, please let Jonathan know.

- **A Visit To The Darlington Locomotive Works.**

  PEEMS is considering a day trip to the Darlington Locomotive Works. David Proctor has liaised with them and they said that they would prefer us to attend on a date when their ‘*P2 Road Show’* is on. ‘*The P2 Road Show*’ relates to the project to build a brand new Gresley Class P2 No. 2007 ‘Prince Of Wales’. ‘*The P2 Road Show*’ includes a presentation and a tour of the works.
  There are five dates this year for the *P2 Road Show* and they are all on Saturdays, and are in April, July, August, October and November.

- **A Note From Paul Windross.**

  Steam Engine For A Motor Bike Or Three-Wheeler.

  Had a test run on compressed air as this project requires a great deal of high pressure air to run on the proper inlet valve timing I had to retard it.

  Also put a lathe faceplate on the crankshaft to give a bit of mass to overcome the compression stroke.

  I am stripping the power unit to reduce weight where I can and then lock everything with various tab washers.

  With my small compressor achieved around 240rpm.

  It’s all fun there is a video on the ME forum:

  Please click on the link:

  Full size version of my record holding 129.33mph model flash steam tethered hydroplane engine. Just running on not very high pressure compressed air.

  https://www.youtube.com/watch?v=ktJRCGuXheQ

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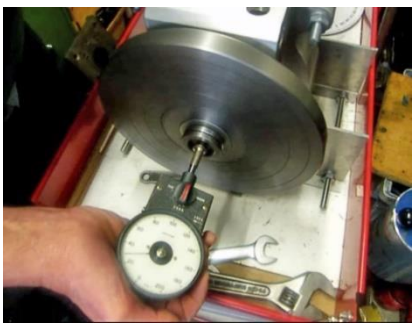


- **Graham Sykes ~ Steam Rocket Bike**

  Graham has had a new end panel welded to his steam pressure vessel to accommodate the two new very expensive American made butterfly type valves.

  They are more balanced for the pressures involved than the original poppet valves.

  He has had it all pressure tested and certified.

  A test was run last week and things look good. There is a lot more to do.

  Hopefully I will see it blasting down Elvington.

  Paul

A Talk By Paul Middleton About The Restoration Of His 'Lucie' Brussels Steam Tram And His Career At The North Yorkshire Moors Railway (NYMR).

PEEMS welcomed Paul to the meeting. Paul is familiar to many members and guests as he appeared in the Channel 5 TV series *'The Yorkshire Steam Railway: All Aboard'* in 2019, which covered a season of running on the North Yorkshire Moors Railway (NYMR). Paul (nicknamed 'Piglet' by his colleagues, for reasons explained later), is the 'Traction and Rolling Stock Manager' on the NYMR.

Paul and his team will be seen again in Series 3 for which filming is complete and will air beginning on Channel 5 8pm Friday 21st February.

Paul's talk was split into two sections:

- His career with the NYMR, and his aircraft modelling interests.
- His restoration and historical research into the career of *'Lucie'* a 19th century Brussels Steam Tram.

- **Paul's career at the NYMR and his model aircraft interests**

  Paul as **'**Traction and Rolling Stock Manager' looks after the steam engines, the diesels and the carriages on the NYMR. If anything is *'on-rails on-wheels',* it comes under Paul's jurisdiction.
  Paul started on the railway straight after school in 1996. He finished school on the Friday and started on the following Monday, and has been there, without interruption ever since. Paul is now a senior manager after working through the ranks. He said he had had a good career and has enjoyed his time at the NYMR.

  To date Paul's career has been as follows:

  - Started in December 1996 as Engineering Apprentice.
  - Promoted to 'Mechanical Foreman' in 2007. At the age of 27, being in charge of all the people who were there when Paul was an apprentice, was a challenge, but everyone works well together as a team in which there are several skilled engineers.
  - Depot Manager (Shed Master) at Grosmont. February 2016.
  - Traction and Rolling Stock Manager, filling a vacancy. September 2017.

- **Model Aircraft**

Paul has always had an interest in hands-on engineering, and has had an interest in models and model-making from a young age. These models have been mainly aircraft and helicopters.
Paul has always flown aircraft models and has done a lot of building of plastic vintage model aircraft with PAW (*Progress Aero Works*) model diesel engines. He also has built vintage 'free-flight' models.

Paul also flies his full 3D capable helicopter the *Raptor 50,* which has been 'souped up'. It has carbon fibre blades, tail boom and frames. It has a 2hp OS engine which runs off methanol. It flies inverted and sideways.

Paul belongs to a model flying club at Whitby which has about 25 members.
Paul also races model gliders under a discipline called 'F3F'. The model glider shown is an Austrian *Scorpion F3B,* made from carbon fibre. Paul had this made to his own specification for racing. It has a 3.2m wing span and has been flown in a lot of competitions. Paul has other models which are flown according to the weather conditions. For example, the *Scorpion* is for 'Thermic' conditions, when there a number of thermals. There are heavier models for turbulent conditions, for instance '*Lead Sleds'* for very high winds, and light models for light winds.
Paul has enjoyed competitions all over the country.
He has held the British speed record for a model glider….for 15 minutes…. until he was beaten by less than a second!
F3F racing takes place over a kilometre course, and there are two pylons 100m apart between which the gliders fly ten lengths. The gliders fly out for 30 seconds to get clear of the first pylon. The glider then has to get back on course again, and the 10 lengths between the pylons are then timed.
It sounds simple but is hard in reality, as the glider needs to be within one foot of the pylon on the turns, and consistently. Paul's fastest time was 31 seconds for the kilometre including the turns at each pylon. Someone worked out that the gliders are pulling over 50G on the turns. The *Scorpion F3B* is capable of +250mph. They make quite a noise when they're flying.

Dynamic Soaring: Spencer Lisenby of *DSKinetic* in America is trying to break the sound barrier with a model glider. The video is at this link (please click on the link to play):

https://www.youtube.com/watch?v=nv7-YM4wno8

To return to the newsletter please press the arrow at the top left hand of the screen.

The glider is flown 'by sound' as it going so fast it is difficult to see it. The 'dynamic soaring' is done in the mountains, and the model has to be very strong. The glider is currently up to 700mph

- **Working At The NYMR**

Working at the railway is very much a team effort. What is required to run the eighteen miles of railway is quite a task. Here are some statistics:

- 60,000 steam miles in 2018. The running has to be as reliable as possible to give the passengers the best value for money. Steam engines are very expensive to restore. For example, an 8'x10'x ⅝" copper sheet to repair a firebox cost £14,000.
- 22,000 diesel miles in 2018. The diesels are needed as a support service, in case of the occasional failure of a steam engine, although they are not as popular with public as steam is. Last year there was 99.7% steam availability, which is very good considering most of the steam engines were 'on the scrap heap' sixty years ago. Most engines run between 6,000 and 12,000 miles a year. The nature of the line means they have to work hard.
- 2500 tons of coal each year, which could be causing Paul some problems in the future. The NYMR is the biggest preserved railway in the country, and getting coal at a good price, so that the railway can make a profit which can be reinvested back in, is proving quite a challenge. Currently the coal comes from Shotton, which was due to close last summer. They are trying to keep the mine open for as long as possible, because on the other side of the A1, they are trying to get permission for an open cast mine which hasn't happened yet. If that doesn't happen, in June Paul will only have two choices: Scottish coal or Ffos y Fran in Wales. The latter is a very soft coal and doesn't travel well. Paul is going to trial a sample load, which is £100/ton more than the current coal. At 2500 tons/year that will be a huge increase in costs if it's used. He'll have to try it. The fire grates have to be altered, with extra gaps to allow the passage of primary air otherwise the grates will melt. Maybe within the next five to seven years coal will have to be imported, and cost-effective methods will have to be found to do this.
- 40 staff within the 'Traction and Rolling Stock' department. There are about 12 people in 'Carriages and Wagons' and the rest are at Grosmont looking after the steam engines.

- Average age is 40. They are quite a young team. It wasn't long ago that there was a concern about the age profile on the railway. Through the *Junior Volunteer Group,* and picking the apprentices carefully so there is a chance they will have the passion to stay and make their career at the NYMR, is a strategy that seems to be working.
- New facility at Kirby Misperton (KM). The new facility at KM is still in its early days. 'Carriages and Wagons' has limited space. Space on the railway for engineering departments is difficult because land is at a premium. CNC and milling machines have been set up at KM where bogies are being overhauled. A lot of machines have been donated by colleges etc. Paul has been to a decommissioned coal fired power station at Cottam. Thanks to the TV series and a NYMR volunteer contact, Paul was invited down and given a guided tour. He was then asked what equipment he would like for the railway! They had cranes, forklifts, lifting tackle, jacks, and pull-lifts. They also had a lot of Whitworth nuts, bolts and studs and boiler tubes. Paul also got an overhead gantry crane.

- **Current Challenges**
  - Coal: As mentioned before, a difficult one.
  - Drop Light Windows and MK1 Coach Central Locking: The ORR (Office of Rail and Road) are very concerned about people being injured or even killed by sticking their heads out of the train windows. Last year there was a fatality in the South for this very reason. There is an investigation into restricting the door opening so people can't stick their heads out. This is a problem operationally, because there is a need to open the window fully in order to reach the outside door handle to get off the coach. Having door handles on the inside would also be a problem because doors could be opened in transit. Central door locking is a possibility, however, on the Mk1 coaches they really need to be as aesthetically as close to the original as possible. The reality is that if the ORR say they have to do it, they'll have to do it. This will mean extra connections between the coaches, there will be extra panels, and the guard will have to have an access key to release the doors and lock them. This will affect 40 coaches.
  - Retention tank toilets: This is happening. Paul was at *Vintage Trains* in Tyseley, Birmingham. There is a 'network change' on the national network. Effluent is no longer allowed to drop onto the tracks. Because the NYMR runs on *Network Rail* track between Grosmont and Whitby, this is a problem.
    On current NYMR coaches, when the toilet chain is pulled, the effluent is discharged straight onto the tracks. Simple, but not pleasant for the carriage fitters who have to work on the system.
    A 'retention tank' will have to be fitted to all 12 coaches with toilets. The aesthetics will need to be as close to the originals as possible, but have a facility that is easy to empty. The aim is that the retention tanks will be emptied every three days in peak season. Even the fitting of the tanks requires 'trace heating' in case the effluent freezes in a cold winter.
    Macerator (grinder) toilets were looked at, but the power consumption for them and the variation of power consumption was not acceptable. Therefore vacuum toilets are being looked at. Because *Network Rail* are paying for this, Paul has decided to acquire the best toilet available, which is Swiss. This has been accepted. It will be like a modern toilet in a modern train, which is vacuum operated. There will be a digital panel which will show what level the toilet is at. It is a clever system, and the battery capacity will have to be increased to cope with it. The tank has to survive 'roll-over' and up to 3G shunting incidents, without separating.
    The new carriage shed that will be built near Newbridge will eventually connect directly to the sewage system.

- **Current Status Of Engines And Coaches In Restoration in 2019**

  - **92134** This is the big 9F Class which is now back in traffic.
  - **825** The big *Southern* S15 is now back in traffic.
  - **'Lucie'** Not completed yet.
  - **Pullman Coach 'Garnet'** is now back in traffic.
  - **Restaurant Mini Buffet (RMB) 1878.** Now compete. These coaches are very popular and the NYMR would like three so there can be three standard coach 'sets' on each train. This is important because a lot of people book on-line, and having these coaches will make it easier for the girls taking the bookings knowing what seats are available.
  - **29 *'Lambton'* Tank Engine.** Now back in traffic after a major rebuild. It's had a new cylinder block. Luckily the only drawing available for the engine was the cylinder block.

Questions and Answers

Q How do you go about swapping engines around?

Paul The engines on the NYMR are essentially hired. I have contacts with most heritage railways and basically engines are exchanged between them. There are mutual agreements between railways where an engine is borrowed from one railway, and they borrow one back from the NYMR in return. The NYMR will pay for the hire of the engine. For instance, if I want an engine from the *'Keithley and Worth Valley'* railway, NYMR would pay for the transport to get it to and from site, and a daily '*steaming fee'* is also paid. *KWVR* could hire a locomotive from the NYMR in the same manner. The further away an engine is transported, the more expense.

Q What is the prospect of getting the S160 (United States Army Transportation Corps) restored?

Paul It's restored, it's finished. Episode 1 of Series 3 of *'The Yorkshire Steam Railway'* is all about the S160. It was run in August, September and October 2019, and it's now on the *Churnet Valley Railway* (Staffordshire). From there it is going to the *Paignton and Dartmouth* Railway where it will be 'home based'. I'm not the greatest fan of S160s, as they are very 'rough and ready'. They are well modified from original with a mixture of metric and Whitworth bolts. With the air brakes they are quite challenging. They are very smokey engines without a combustion chamber within the firebox, and that was mainly due to ease of manufacture and cheapness.

Q The government seem determined to reduce carbon emissions going into the future. In the longer term will there be the will to keep preservation railways going? Will an alternative fuel have to be used?

Paul In my opinion it will keep going in some form or another. Currently there is no risk to the NYMR in burning their fuel. That's been made clear. Our General Manager goes down to London a few times a year and works with *The Heritage Rail Association.* DEFRA are working towards banning the burning of fossil fuels. It was meant to have happened in Ireland last year, but this meant the banning of log burning stoves, and coal and wood burning in peoples' homes. Currently that is on hold. That is meant to happen in this country as well. The NYMR are looking at alternative styles of fuel, but none of them have worked yet. This is because a steam engine is designed to burn a very specific size and grade of coal. It is very difficult to get them to do anything else. Oil burning is a non-starter as it is no cleaner. I've tried burning compressed wood briquettes, but these were ejected out of the chimney as soon as the regulator was opened. Compressed ovoids with low sulphur content have been tried. They work quite well for bringing the engine into steam, but they break down very quickly and fall into the ash pan, which can distort due to the molten mass.
What is seriously being looked at is '*Carbon Offsetting',* where land has to be bought and planted with trees.

Q Do you import engineering work, do you do contract work for other railways?

Paul Not really. We have done contract work in the past, but currently we don't really do engineering work for other railways. *Armstrong Oilers* (now owned by the NYMR) make oiling (lubrication) pads for under axles. A lot are sold to Hong Kong Tramways and to railways in America.
There is too much work on the NYMR to be doing work for other railways. There are other companies like Rileys at Tyseley who do that. They have a smaller railway but concentrate more on overhaul.

Q How did you get the nickname 'Piglet'

Paul When I started at 16, I was up in the 'brew room'**,** and I was sitting next to the welder. He opened up his sandwich box, and there was a small plastic piglet put in there by his grandchildren. He said to me "you look like a little piglet" and that was it, the name stuck. Everyone on site has a nickname. Listening to other nicknames around the place, that name was relatively innocuous, so I was happy to stick with that!

Q How many volunteers do you have?

Paul It is difficult to quote an exact figure, but there are over a thousand volunteers. At Grosmont we have a regular group of volunteers. Some come on a Tuesday, some on a Wednesday. The footplate side of things is nearly all volunteers. There is a nucleus of paid staff in case someone is not available (I have sometimes stood in on the footplate). We have volunteers from all walks of life, from undertakers to airline pilots to engineers.
The Junior Volunteers Scheme has been very good and awards have been won. The juniors are young but are closely supervised, and have written approval from their parents to be on the scheme. Young people are actively engaged. On a Saturday, Junior Volunteers are there machining and making, for example, scribers and stepped shafts. You don't often see that nowadays. Hopefully these are the people who will take up model engineering in the future. Some of the Junior Volunteers are even driving engines. *The Junior Volunteers Scheme* has worked well with attendances up to about twenty. We don't want too many because supervision then becomes an issue. Some have gone on to careers on *Network Rail*.

- **Paul's Restoration And Historical Research Into The Career Of *'Lucie'* A 19th Century Vertical Boilered Brussels Steam Tram.**

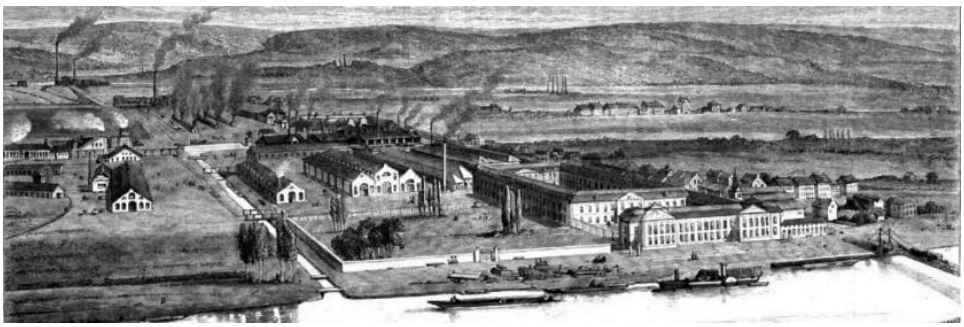
- **Introduction**

Paul bought *'Lucie'* in 2016. It was by chance. He was at *The Middleton Railway* (Leeds) looking around, and while there saw this very unusual little engine, and started asking questions. They told Paul, he could buy her if he wanted her. Paul made an offer, and two weeks later they told him she was his!

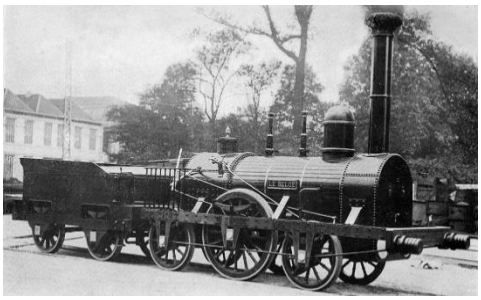
The restoration has taken up a lot of Paul's spare time. When Paul bought 'Lucie' he didn't have much information about her. The only information was on the display board next to her. It turned out that nearly all the information about the engine was wrong, apart from the works number and the name. 'Lucie's' history is very interesting though. Paul has nearly finished restoring her. On the 17th February 2020 the boiler will be hydraulically tested, and at the end of February the boiler will be lowered in and installed. Mechanically she is finished.

These vertical boilered engines never operated in England, and were very much continental engines. They were sold all over Europe, and out as far as Russia. The majority, though operated in France and Belgium.

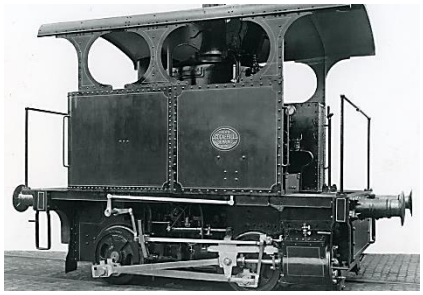
They were built by one of the major iron and steel producers in western Europe,'*Société John Cockerill,.* This Belgian iron, steel and manufacturing company was based in Seraing in the region of Liège. It was founded in 1825 by British industrialist William Cockerill and his family. The company was a major producer of rail, railway locomotives and other large-scale iron and steel constructions. The Cockerills basically started the industrial revolution on mainland Europe. They were originally from Lancashire, and all three sons moved over to Europe. It was John who took over the business. It was a huge business and still exists today.

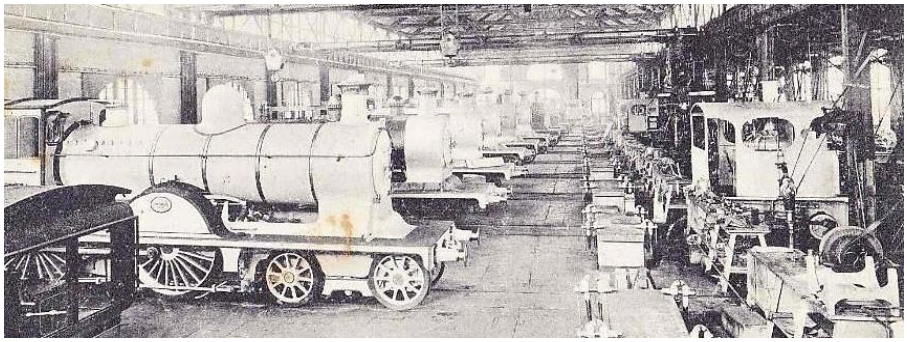


Cockerill built the first steam engine '*Le Belge'* in Belgium. This was built under licence to a design by Robert Stephenson. It was built originally in 1835, and the photo shows a replica. They built most of Belgium's steam engines, and it was a hugely successful company. They also built cannons and artillery for the First and Second World Wars. They were taken over by the Germans twice. They built steam cranes as well.



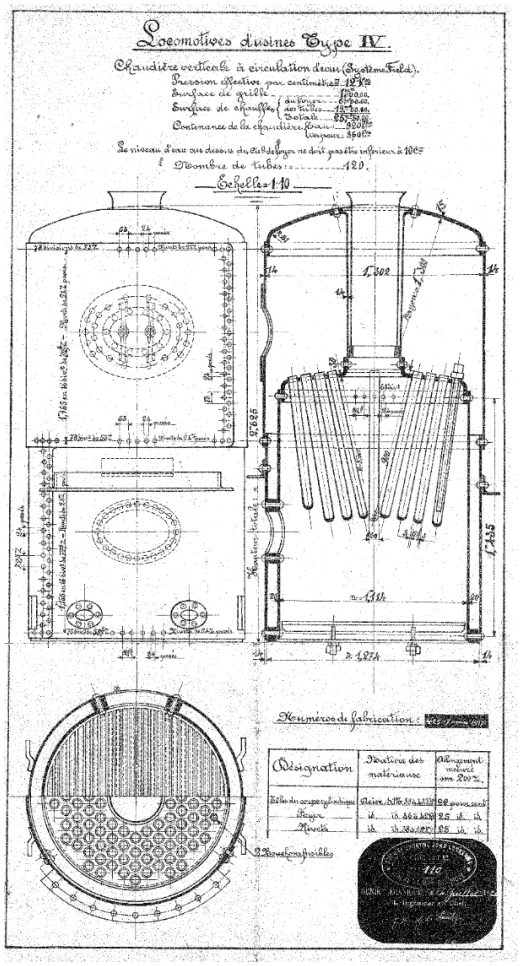
The photograph below shows the locomotive shop and on the right, the small industrial "Cockerill" locomotive which is like 'Lucie'. It's a Type III which is a slightly smaller version. The photo on the left is a Type IV.





- **Boiler And Running Gear**

The vertical boilered engines were mainly built for factories, and the design of them was clever compared with the more conventionally sized “Peckett” type locomotives with the horizontal boilers used in this country. The “Cockerills’ go from stone cold to full pressure in 45 minutes. They have a “Field Tube Boiler”. Unlike the vertical boilers in this country, which are ‘Cross Tube Boilers’, their boiler has what look like test tubes hanging down from the crown towards the fire. They are blind tubes.



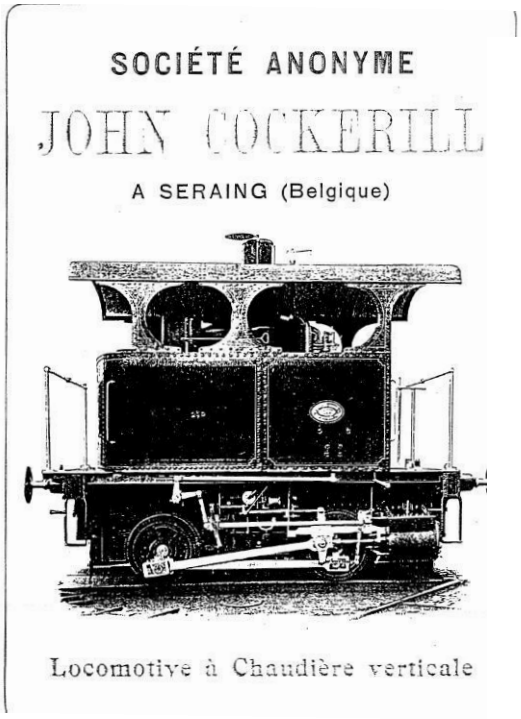
The “Cockerills” were marketed on their short ‘prep time’ of 45 minutes. That meant the man hours to run them was optimised. There’s no disposal at the end and there’s no smoke box to dig out. The boilers can be lifted out very simply by taking the cab roof off. This means boilers could be exchanged easily, with any boiler needing work, just lifted out and replaced. It could then be repaired in the works. The replacement could be done in one day’s turn around. This is much easier than a conventional engine where half the engine has to be stripped down to get the boiler out.

The ‘rolling chassis’ is fairly conventional and this was one of the first engines to have Walschaerts valve gear. In the 1860s Walschaerts sold the design to Cockerill. *‘Lucie’* is a Type IV engine (like that shown at the bottom left of the previous page). The valve gear is slightly different because there isn’t a return crank onto the expansion link (which is driven by an eccentric on the inside). The bigger Type V version did have a conventional return crank.

The valve gear design was influenced by the fact that it is quite close to the ground.

There is a crosshead driven water pump and one injector inside the cab. It’s a neat design, which wasn’t changed in eighty years of production. They built about eight hundred of the various types. They are very common across Europe. About thirty have survived into preservation. As a design they were successful, running up until the 1960s. Three of them made it to Ireland to work at a potato factory

Paul started researching the engine after buying it. NYMR have a ‘Facebook’ page which is an information page so people can see what’s going on in the sheds. When Paul bought ‘Lucie’ he put the details on the information page. Someone from Belgium, who had been on a riveting course at NYMR, wrote to say he had the ‘Work’s Supply List’ of the “Cockerills”, and where they were supplied to, and would Paul like a copy.

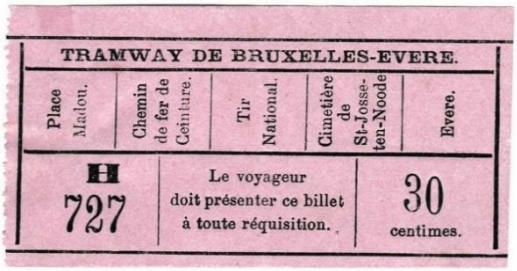


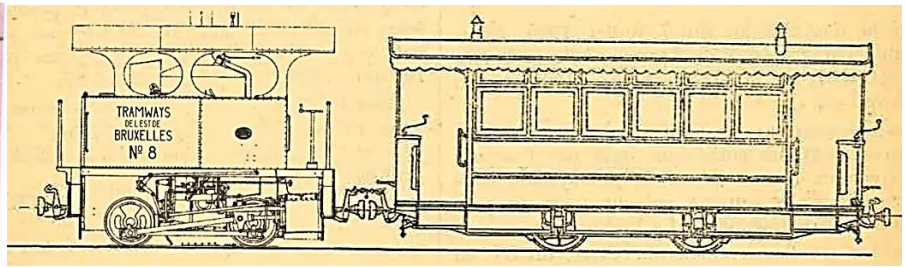
ANNÉES	Numéros des machines	Type des machines	NOMS DES COMMETTANTS	
1889	1575	III	Société de l'Espérance, Seraing.	1re
"	1576	III	Société anonyme des Glaces de Moustier.	1re
"	1577	III	Société Métallurgique du Midi de la Russie, Kamenskoïe.	2me
"	1578	III	id. id. id.	3me
"	1581	IV	Service des Transports Cockerill.	25me
1890	1545	II	Société anonyme des Mines de Meurchin.	2me
"	1579	III	Dumon et Cie, Tournai.	1re
"	1582	IV	Société anonyme des Tramways de l'Est de Bruxelles.	1re
"	1613	III	Dumon et Cie, Tournai.	2me
"	1614	III	P. Regout et Cie, Maestricht.	2me
"	1623	IV	Compagnie des Mines d'Ostricourt, Oignies (France).	1re
"	1624	IV	Société anonyme des Glaces de Charleroi, Roux.	1re
"	1543	II	Carrières de Sable d'Ostricourt, Libercourt	1re
"	1615	III	Gruyelle-Marchand, Henin Liétard, Pas-de-Calais.	1re
"	1616	III	id. id. id.	2me
"	1617	III	id. id. id.	3me
"	1618	III	Ste Ane des Forges et Aciéries de Huta-Bankowa, Dombrowa	1re
"	1625	IV	Société Anonyme des Tramways de l'Est de Bruxelles.	2me
"	1626	IV	Service des transports Cockerill.	26me
1891	1620	III	id. id. id.	27me
"	1619	III	Société des Houillères de la Haute-Loire, Grosménil.	1re
"	1621	III	Chemin de fer de la Robla à Valmaséda, Bilbao.	1re
"	1622	III	Carrières de Sable d'Ostricourt, Libercourt.	2me
"	1634	IV	Colonel Schewtsoff, Russie.	2me
"	1635	IV	id. id. id.	3me
"	1636	IV	Service du Mouvement, Transports Cockerill.	28me
"	1628	III	Société anonyme du Charbonnage du Boubier, Châtelet.	1re
"	1629	III	Société anon. de Courcelles pour la fab. de glaces, Gosselies.	1re
"	1630	III	Société de la Nouvelle-Montagne, Engis.	1re
"	1631	III	Société générale del Puerto de Pasages, Pasages.	1re
"	1632	III	Schneider et Cie, Creusot.	4me

‘Lucie’ Works No. 1625 Type IV " | 1625 | IV | Société Anonyme des Tramways de l'Est de Bruxelles. | 2me

- **Working Life**

Paul did know the Works Number 1625, as it was stamped on every part of her, apart from the piston gland on one side which came from another engine. The document showed that *'Lucie'* was sold to a tramway east of Brussels. This was interesting as everyone thought these were industrial engines. Paul found that his engine was sold as new, to pull a tram in Brussels City, on a line which ran from *St Josse Place* to *The Brussels Cemetery* at Evere.
Further research on-line resulted in Paul finding a lady who was a tram historian. She's carried out a huge amount of research for him.
'Lucie' was sold new to the tramway in 1890. Prior to that, they had used six Krauss tram engines. They then bought two Cockerill engines, No. 7 and No. 8. It later transpired that No. 8 was actually *'Lucie'* (1625). At that point Paul didn't know she was No.1625 as she had been designated No.1 at *The Middleton Railway.*
An original ticket was found, and also shown below is a representation of what the tram would have looked like with *'Lucie'* pulling it.

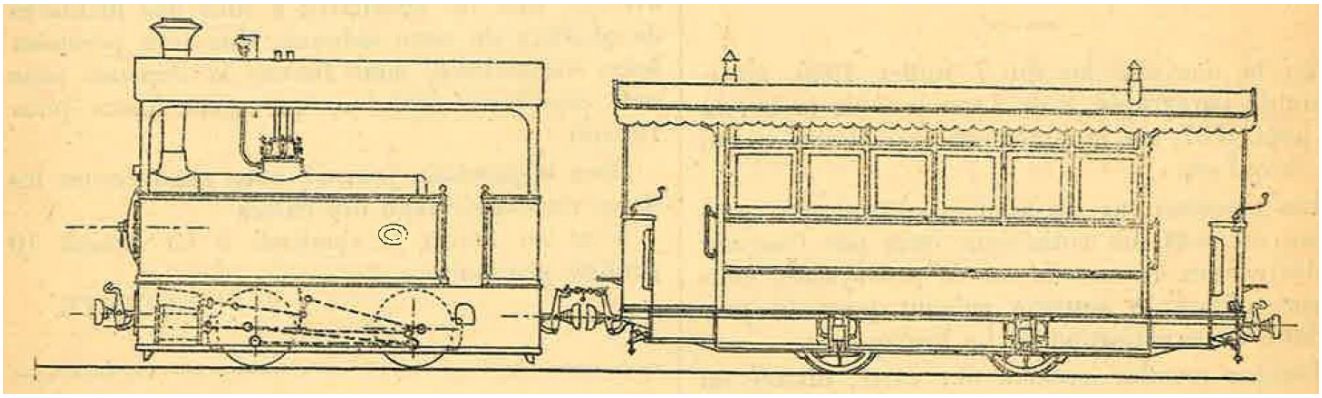




The tramway operated six Krauss engines from 1883.
The Cockerill engine No 7 (1582) was supplied in 1889 and No. 8 (1625) in 1890.
The company also owned ten closed cars and eight open cars, and they would run a mixture of commuters and people going to funerals at the cemetery.
They also ran funeral trains and had a special car with curtains that they could put the coffin in. *The Brussels Cemetery* at Evere was relatively new then. There were various small cemeteries around Brussels, but Brussels was expanding at quite a rate and they consolidated by taking all the bodies from the smaller cemeteries and buried them in the new cemetery. On the 26th August 1890, there was a large event at the cemetery because Queen Victoria had sanctioned a large mausoleum for the remaining dead officers from the Battle Of Waterloo. On that date there was a huge unveiling ceremony. The records in the newspapers show that the little tramway with its 'new locomotives' was very busy that day, transporting passengers who had come over from England to the unveiling. George the 'Duke Of Cambridge', came from England to host the event on behalf of Queen Victoria. It will probably remain unknown whether he travelled behind *'Lucie'*.
There are no known pictures of *'Lucie'* running around the streets, but the 4km long route it ran on is shown on this ticket:

Eventually steam trams got banned, because when they got into the city itself the smoke emissions and noise were unacceptable. So they went back to horse drawn trams on that section. At that time they were experimenting with different forms of traction. They went from horse drawn trams to steam engines, and then they tried battery operated trams which worked fairly well but struggled with the inclines. They eventually used electric trams which was the real solution because they were clean, didn't make much noise, and were easy to operate.

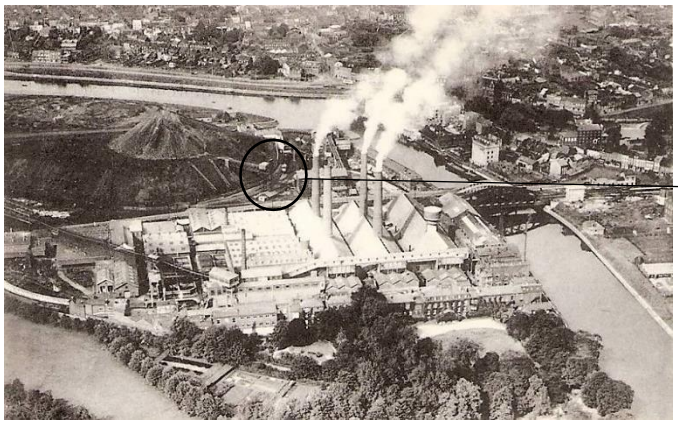
The researcher found a picture of a Krauss engine pulling a carriage. The picture above showing *'Lucie'* pulling a carriage is 'mocked up' from this.



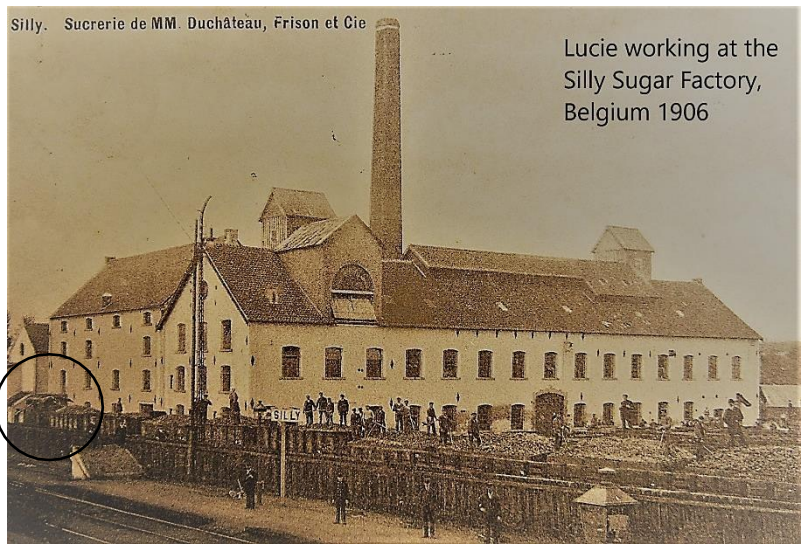
This picture showed what the carriages were like, basically a modification of a horse drawn carriage.

'Lucie' didn't run very long as a tram, just from 1890 to July 1891. The line was regauged as metre gauge from standard gauge to fit in with the rest of the SNCV system. This happened on the 2nd July 1891, so *'Lucie'* then became surplus to requirements.

Once *'Lucie'* was sold as a tram, she very briefly worked at a zinc mine near Liège. This is the only photo Paul can find of the *Vieille Montagne* zinc mine. Lucie wasn't there long. The zinc mine is researching the engines used at the mine, but it could be some time before the result of the investigation is known. There is a small line with what appears to be an engine on it. The bridge over the river carries a main line.



'Lucie' didn't stay at the mine long, because the records show she was then sold to a sugar factory in Silly. Paul went to a 'Facebook' 'remembering' site for the history of the factory. Within half an hour of a posted request for information on *'Lucie'*, Paul received the following photograph of the factory in 1906:



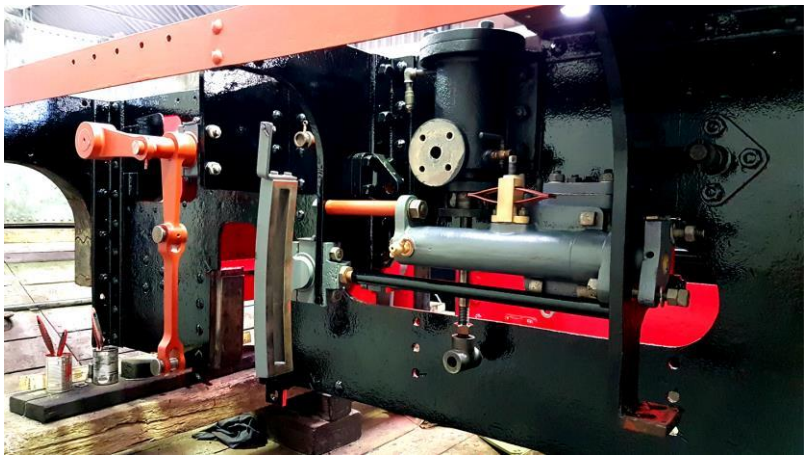
The lady who posted the photograph said that they used to go down to the factory to see *'Lucie'* which confirmed the information. They only had one steam engine there. This is the only known photograph of her working. They got the sugar beet and the pulp from the fields which was transported to the factory on the main line. The wagons were pulled in off the main line by *'Lucie'* and the sugar beet was processed at the factory. *'Lucie'* then pulled the empty wagons back onto the main line. The factory is still there, but in a derelict condition. Paul has been put in touch with the owner's son who invited him over to see it. The track is still there although a bit overgrown. The old workshops are still there. The factory was taken over by the Germans in the Second World War, and after the War it never reopened. *'Lucie'* then vanished until the mid-1970s when she was found in an industrial suppliers yard. She was then brought back to England in the 1980s by the then owner of *Jensen* cars who brought another four locomotives over with her.

- **Restoration**

The Chassis

After buying *'Lucie'*, Paul restored her in his spare time. It has been a complete and thorough overhaul. There are no drawings apart from the boiler. The chassis is fairly simple, but was in nice condition. For an industrial type engine, she hasn't had a particularly hard life. Paul could tell by the straightness of the rods and the lack of 'hammer lash' anywhere. The engine was completely stripped down and the alignment of the slide bars and axle boxes was done. New bearings were machined, the water pump was rebuilt with new balance seats and a new balance strip had to be machined.

Chassis Before.

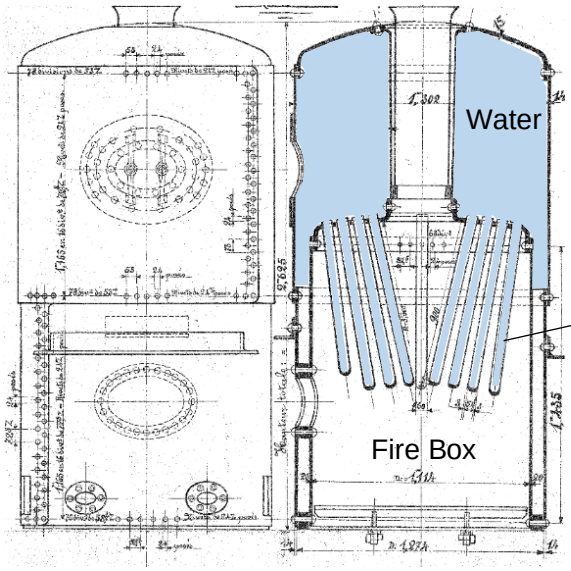


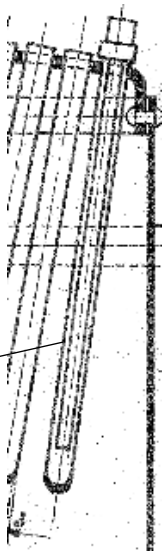
Chassis After Restoration

She has a brand new stainless steel piston rod. She has new brake cylinder pins. All the motion pins are brand new. There wasn't a lot wrong with the old ones but some restoration was required. Paul bought some EN16 steel for the job. The design is very simple and nice to work on. Compared with other engines in the shed *'Lucie'* is easy to break down into her component parts for repair.

The Boiler

The boiler is tall, and as mentioned previously, is a 'Field Tube Boiler'. Horizontal boilers are usually 'Smoke Tube Boilers' with the fire in the firebox passing down the centre of the tube, with the hot gases boiling the water, and then going out of the chimney. With the 'Field Tube Boiler' the 120 tubes are full of water. The access to the tubes to fit them is difficult as the access hole as shown is small, and getting to each tube is a challenge.





Tube Detail

Inside each tube is another tube to circulate the water. If that wasn't there, the tube would be boiled dry and the tube would melt.
In terms of coal and fuel, these boilers are not the most efficient of types, and they can be a bit smokey as there is no combustion chamber. In terms of operation, however, they are brilliant as they only take 45 minutes to fire up. The boiler has been restored back to its original condition.

This is the condition of the boiler the previous weekend. Unfortunately, when it was at *The Middleton Railway, 'Lucie'* was parked outside, and thieves got in and stole all the copper piping and some fittings. Paul has had to start afresh and remake all the pipe work. There isn't a lot of it. At the weekend, Paul made all the copper pipes for the brake exhaust and the blowers. A lot of the gauge frames and all the drain had been stolen. There were no drawings for those components. There is another "Cockerill" running down south, and the owner took photos of the necessary parts layed out on a table. New components will be machined using these photos and Paul will try to make the replacements as near to the originals as possible.
On the left and on the top of the boiler is the regulator valve which sits on the top of a hole through the boiler top. This includes an inverted 'carrot' valve (cast iron and tapered) attached to a two feet long handle. As it is inverted, when the steam builds, the 'carrot' is pushed further into its seat. To stop the 'carrot' dropping out into the bottom of the boiler, a spring and nut are used to hold it in place with tension.
The whistle sits on a stantion to get it out of the top of the cab.
On the top of the boiler on the right, there is pipework for the brake. This is new because it didn't have a vacuum brake. There is also a blower and two safety valves.
The only addition in this area is a valve for steam heat.She will have steam heat capabilities. Paul sees one of her main uses is for preheating the diner cars. The locomotive itself will not have a huge amount of use on the NYMR, but Paul wants to use her to preheat the diner stock and other trains. One of the biggest complaints on the railway is cold carriages. People turn up in good time to sit in the carriages before the steam engine is attached. *'Lucie'* can be connected to heat the carriages, and she will also be good to look at.
The brake valve on the left just below the top is interesting. It's just a 'carrot' valve. It is shown in the 'pull-on' position. There is a 'lap' position as well, so the brake can be put on, but to get it off, it has to be pulled right around to the right.
The down side of these boilers is that they are noisy for the driver as he stands next to the chimney.

Paint and Livery

The research found that the livery on the trams was olive green with red linings, with a large inscription on the side. The inscription was *"Brussels In Evere"* which was later changed to *"Eastern Brussels Tramways".* There was also a large Number (7 or 8). Both the numbers and the inscription were originally white shaded in red, each side of the engine. The only deviation Paul has done to the inscription was painting it first in white, but as that didn't look right, he's used a slightly creamy colour which looks nicer. Paul is trying to restore the engine as best he can to the condition she was when she came out of the factory in 1890.

This is the locomotive last summer. Paul got one of the volunteers to help paint her. Paul put the green paint on, and the volunteer did the lining out and the inscriptions.
It is *Craftmaster* paint and it is hard to apply, but once it's on it is superb. There are six coats of paint on it. It took three weeks of work to get it right.

'Lucie' is standard gauge so she can run on the NYMR. It would be interesting to see if she can run the full length of the line. In relation to the amount of water in the boiler, the tank is huge, so there shouldn't be any issue with water supply.

"Cockerills" will only travel at 20 mph flat out. When they are doing that speed, they sound like an express train

Here are some videos of some "Cockerills" running:

Please click on the links:
To return to the newsletter please press the arrow at the top left hand of the screen.

https://www.youtube.com/watch?v=0nuHO0lkJKo

https://www.youtube.com/watch?v=BJA1bya9SG4

https://www.youtube.com/watch?v=m77kaB-sphM&t=50s

https://www.youtube.com/watch?v=sf2TwhXMPhg

https://www.youtube.com/watch?v=hXgkKZgLkb4&t=227s

https://www.youtube.com/watch?v=pt4g7b40lCw&t=30s

Questions and Answers

Q The "Cockerills" have relatively small wheels. Is the wheel loading for a small wheel the same as for a large wheel?

Paul It depends on the weight of the locomotive and how many wheels there are. *'Lucie'* weighs about 20 tons on four wheels. I haven't weighed her yet but the weight should be evenly distributed with about five tons per wheel. For *Mallard* the loading on each wheel set varies. There's about 20 tons on the front bogie (5 tons/wheel) going up to 18 tons on the driving axles (and they vary slightly), and there is about 18 tons on the rear Cartazzi wheel set.
It was one of the challenges of locomotive design that the more driven wheels there were in contact with rail, the better the tractive effort. However, the more driven wheels there are, the more complication there is in the design. More weight carrying bogies, however, improve the ride characteristics of the locomotive and help drive it through the curves.
The size of the driven wheels on a steam loco is essentially the gearing. There is no gearbox on a steam locomotive and there is an optimum speed at which it is the most efficient. This means the driven wheel size is geared to the task it's performing. *'Lucie'* has small wheels because she is designed to pull as many wagons as possible at low speed. *Repton*, one of the NYMR's larger locomotives has large wheels because the speed needs to be 'got up'. There is a point where the piston speed on a small wheel reaches a maximum and can't do any more as it is restricted by the valve gear.
'*Big Wheels – Fast …. Small Wheels-Slow*'.
Logging locos are geared because they travel on hastily assembled track. They have bogies for maximum movement but have maximum traction with all wheels driven.

Q Did *'Lucie'* run at *"Middleton"?*

Paul Yes. When she came to England she started at *'Peak Rail'*. She ran there for five years, and *"Middleton"* ran her for five years. I have all the maintenance records.

PEEMS would like to thank Paul for a very informative and interesting talk. We would also like to thank Paul for giving kind permission to reproduce his photographs in this newsletter and taking time to proof read this article.

PEEMS Visit To Mickle Hill Retirement Village On The 22nd January 2020.

Introduction

There was a good turnout of Mickle Hill residents for this PEEMS presentation. Colin Bainbridge gave a brief introduction and explanation of the Club, and invited anyone who was interested to come to the monthly meetings. The display items gave a good indication of the breadth of the modelling interests of the Club, ranging from stationary steam engines through to locomotives, including a garden railway, aircraft components and a model jet engine. The Club is also an 'umbrella' organisation for people who work in their own time and in their own spaces. The Club allows people to discuss their activities with other members.
People involved in the club are not all from an engineering background, although a few have been professional engineers, which in Colin's experience is unusual. The Club involves people who have been teachers, accountants, and bank managers. Model engineers come from all walks of life. One of the foremost model engineers in the country is a woman.

- **Colin Bainbridge ~ 1/16th Scale Steam Locomotives.**

  Colin said that his particular interest was 1/16th scale locomotives which are big enough to drive once built. Locomotives built to this scale are live steam and are nearly all coal fired as the originals.
  There is the pleasure in the building of something, and then the pleasure of running it once built.

- **David Hampshire ~ 16mm Gauge Garden Railway.**

  David has been a member of PEEMS for thirteen years since he moved up from Norfolk to be near his grandchildren. David however has enjoyed his hobby for over forty years. He belongs to the *16mm gauge* narrow gauge modellers. There are four thousand members in this country and a few thousand more overseas. The *16mm gauge* origins are in the 1930s when Welsh engineers tried to make working models of the narrow-gauge railways that run around Wales. The track width of these railways is 2 feet, or more precisely 1 ft 11½ ins. The only track that was available in the 1930s was a tin plate '0' gauge, which was popular for model railways at that time. The distance across the rails for '0' gauge track is 32 mm. 16 mm at this scale represents 1ft. Hornby '0-0' scale is 4 mm to the foot.

In the 1970s, people got together to form the association that exists today. The *16mm Club* have their own magazine which is issued every quarter.
David has made 12 battery powered engines over 40 years. The blue locomotive (A) is the very first model David made 40 years ago. The last model made (B) was based on an Austrian engine. Davis has built over 60 wagons of which 3 were displayed.

David didn't make the blue steam engine (C) at the front of the display. In the beginning people did build their own steam engines but these can be bought cheaper than they can be made. *Roundhouse* at Doncaster and the Welsh design people manufacture theirs in China. The steam engine displayed came from *Roundhouse*. David built the tender on the back. A lot of 16mm members buy this type of steam engine today.
These models are run on David's garden railway. David brought his track from Norfolk to Pickering and has featured on the Sky Channel ~ *Garden Railways*. The reason garden railways have become popular is because large layouts are difficult to build in small modern houses.
Some Clubs have big layouts of their own. David also runs his locomotives on the *York Model Engineering Society* track. Because the locomotives are independently powered, David can run them on other peoples' tracks.
All the locomotives are radio controlled. Most of the locos are battery powered, but David's steam locomotive is fuelled by gas. It is filled via a tank of gas, and then it can be lit and run as a steam engine. David also has a meths fired one and a coal fired one.
Peter's latest project is to pass his skills on. His grandson has been with him while he built his railway in Pickering, and David has been encouraging him to make his own models. He started when he was six. David has tried to pass his skills onto the younger generation as he believes this is necessary for the hobby to survive. It is a very popular hobby.
When David started everything had to be self-made including the track because it couldn't be bought. Now anything can be bought on the internet.

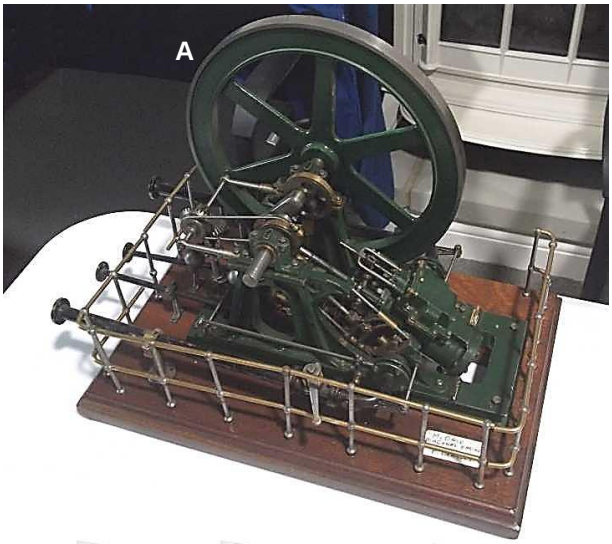
Q Is everything to scale?

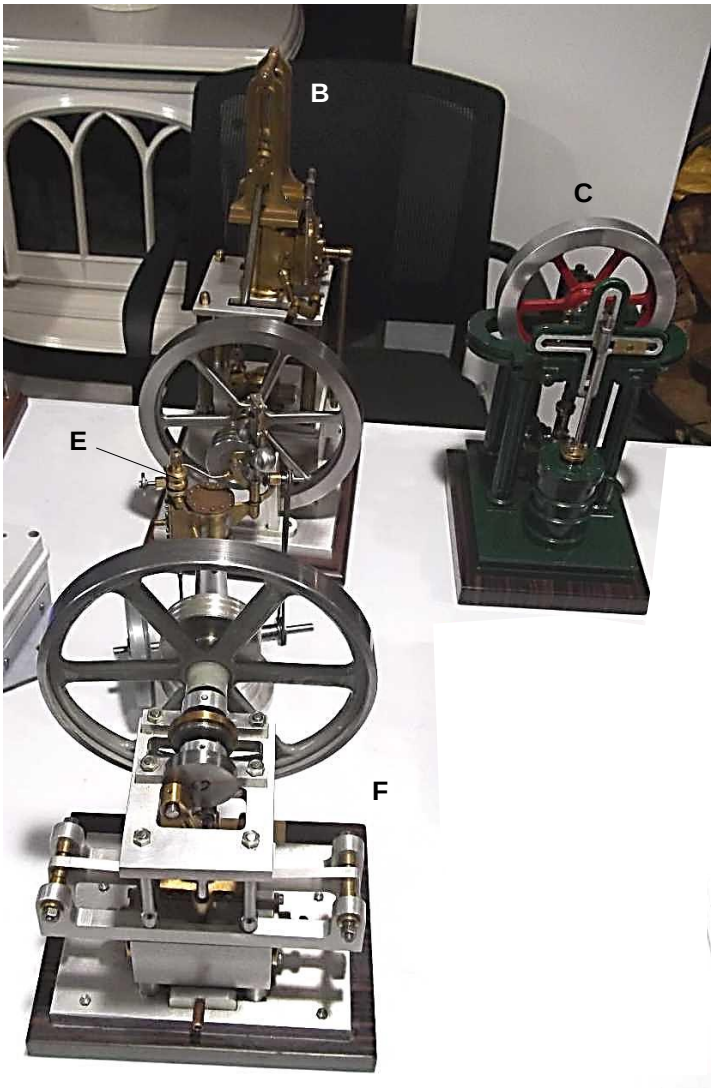
David Everything is to scale including the locomotive driver. The 'Director's Saloon with its roof off reveals the extent to which scaling has been adhered to. Even the sheep in the wagon is to scale.

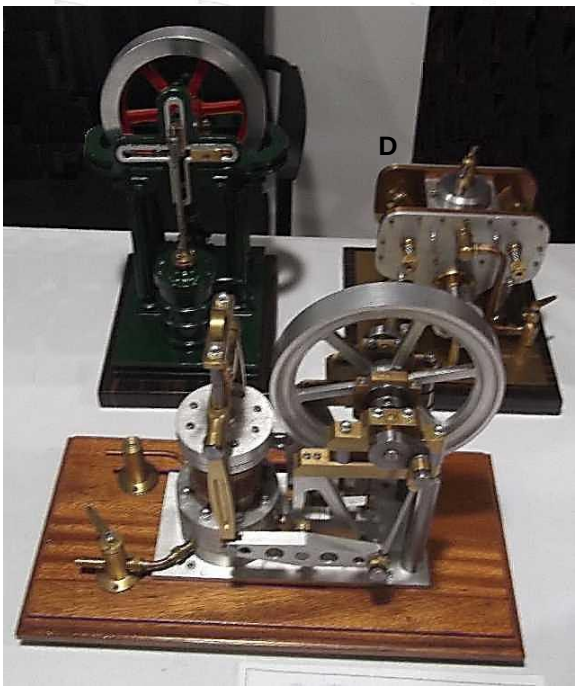
- **Peter Bramley ~ Scale Models of 19th Century Cranes and Steam Engines.**

  Peter said that he has lived in Pickering since 1952, and has been model engineering for about 70 years.
  As PEEMS member, Brian Stephenson wasn't in attendance, Peter was going to explain his models as well as his own.

  Steam Engines: There were six of Brian's steam engines on display with different configurations.
  Both Peter and Brian have made a *McOnie* Diagonal Steam Engine (A). It is diagonal as the angle of the crank shaft to the horizontal is 45°. It took Peter about 18 months to build his *McOnie*. It wasn't particularly hard to make as Peter's main hobby is traction engines.







  There was a *Steeple Engine* (B): Steam comes from below and pushes the piston up. The conrod converts the up and down motion to circular motion through the crankshaft.
  The engine (C) is very interesting. The main operation is behind the cruciform.
  Four Cylinder Oscillating Engine (D): *'Mamod'* model steam engines used a cylinder which oscillated instead of being stationary.
  The model at the front (E) had a governor which controls the speed on a full-scale engine. Governors sometimes work on scale models, but because of friction they are not perfect.
  There was also an *Atkinson Cycle Engine* (F) on display.

  19th Century Cranes: Peter then turned to his own models which were two 19th century cranes. He has made 5 which have worked and a further 3 which have yet to be finished.
  The first crane (A) is a crane which was to load from horse drawn wagons onto railway wagons, or from a boat onto a horse and cart. It is two speed and is a two-man operation.

The other crane (B) was very similar. These cranes are normally shown in a Diorama at exhibitions.

The second model was still a single jib, is made of metal, and has a chain on. This one is single speed. Peter has made all the parts of each crane, including the chains. Peter used to buy gears, but now he makes them himself as he has the machines to do it.

Peter's main interest were traction engines which would have been unsuitable to bring to the venue.
There used to be traction engines rallies in Pickering and the first Peter attended was in 1953.
Unbeknownst to Peter and his family, one traction engine had worked on the farm next to them and that was the 'spurt' to get him metal working.

Q Didn't traction engine rallies happen on the field that Mickle Hill was built on?

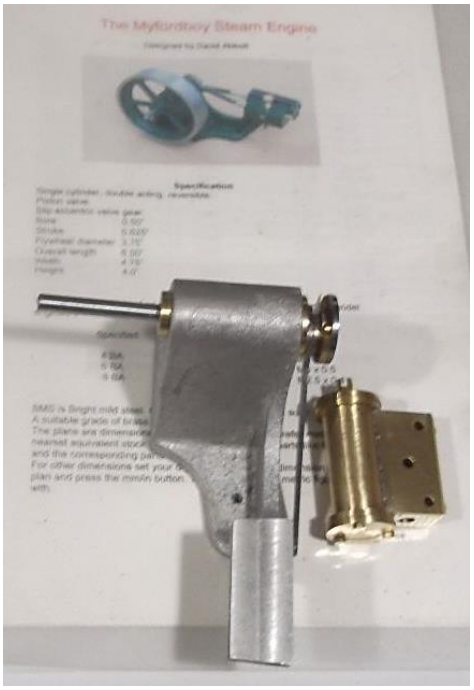
Peter No, it was across the road where the swimming pool now is.

Q Were traction engines used to drive the threshing machines?

Peter Yes. Agricultural traction engines were the dogsbody of farm work. They used to be used for threshing, grinding, sawing etc. a bit like electric motors today.

- **David Proctor ~ *Myfordboy* Model Stationary Steam Engine.**

David admitted he was a beginner at model engineering. He started 2½ years ago when he retired.
This is David's 'work in progress' engine (one of two).
It is a *double acting piston valve stationary engine*.
It has taken about a year and a half to do. He looked on-line for something he could work on, and procured a couple of castings, drawings and stock metal, and started to make it.
The beauty of PEEMS is that there is wealth of talent and expertise on which he can draw for advice and inspiration.
David is aiming to finish this engine for the Doncaster show in May.
The other engine is a triple expansion marine engine, which harks back to David's first job as a marine engineer in the 1970s and 80s.



- **Chris Bramley ~ 1/3rd Scale Model of a *Blacker* Power Ram**

  Chris showed a 1/3rd scale model of a *Blacker* Power Ram that blacksmiths used to use. Chris used to pass one of these going to school when Whitby Road was very narrow (10 ft wide) with no roundabout. There was a blacksmith's shop there. The blacksmith was Wilf McNeil, and Chris got to know him because he was interested. When Chris left school they made Whitby Road wider and put the roundabout in. A few years later Chris set up on his own doing metal work opposite Wilf McNeil's new workshop in Outgang Road.
  Chris got to know Wilf really well. When Wilf died his son sold everything in the one company. They were loading the *Blacke*r onto a wagon, and Chris tried to buy it, but they wouldn't sell him it.
  When Chris retired he decided to build a *Blacker* Power Ram. He didn't know where to find out about them. Wilf McNeil's full-size machine went to metal workers on the Malton to Scarborough Road. They said Chris could measure it and take photographs, but that wasn't good enough, so Chris had to find some drawings. He had to go to some engineers in a village near Gainsborough. They are the only people who sell parts for these presses now. They had a set of drawings which they allowed Chris to bring home to copy, after he showed the manager some photographs of some models he'd made as credentials! He took them back after copying them.
  It didn't take that long to build. He kept in touch with engineers at Gainsborough, and took the model down to show them after he finished it. There were about 150 people living in the village. The work stopped at the engineers, and they went around the village to get their retired workers to come and see the model ~ a great success! The machine is geared so that the hammer moves laterally so different tools can be used in the hammer for different jobs.

- **John Powell ~ Bracket Clock and 'Busker' Organ**

  John began his talk by saying it is a basic human instinct to want to build things. John has wanted to create all his life. John's father joined *The York Society Of Model Engineers* as a founder member in the 1920s. When John was at school at the age of eight, John's father enrolled John as a junior member. John spent quite a time going to meetings which was interesting. In those days people mostly made locomotives because they are large machines made from handmade components which are easy to copy and scale down. John's father started a locomotive but it was never finished. The boiler is what he became 'unstuck' on.
  John's father had a workshop and John was allowed to watch but not touch. When he started, John decided he needed a tool kit. At the time he was sharpening tools on his sandstone back step. He built a tool kit out of nothing. Eventually he built a simple lathe so he could turn things.
  All his life, John has been devising things which he gets a 'kick' out of. The real 'kick' comes when something works. If it is a clock, when it 'ticks' it gives something. When a 'busker' organ is built like the one displayed, and the first pipe is built and it makes a note, and when more are made and they make music, then that's what it's all about. It's not even about big engineering!

  To hear John's 'busker organ press on the following link:

  https://www.youtube.com/watch?v=hubkIqSTETY

  To return to the newsletter press on the back arrow at the top left of the screen.

  When John was an apprentice in the clock business, one of his jobs was to restore an organ clock which had approximately 15 notes. This had been out of action for a number of years, and someone had removed two pipes. John restored this clock by scaling the missing pipes and managed to get it working correctly. John thought he would like to build an organ clock**. Eventually when he retired he went to the traction engine rally, met someone, who was playing a small busker organ with a handle on it. A friend, John Smith, gave John the drawings for his 20-note busker organ and that's where John started. Up to now, John has built four.
  The busker organ on display was designed to fit into a VW Passat.

There has never been a time until this day when tools and equipment have been available, in most cases, at an affordable price. In the past, tools and equipment were expensive. John's first lathe, bought with money saved when John was in the forces, is still in use by a PEEMS member today.
John was displaying his bracket clock which was fairly standard. This is a portable clock. The reason John wanted to make it was because he wanted to make the case in the traditional manner, before machines were used.
The case is made from second hand walnut cut out from of a piece of old furniture. All the mouldings are made in the traditional manner with hand tools (chisels etc.).

** an example of an organ clock can be found at this link:

https://thelistenersclub.com/2018/03/02/an-18th-century-novelty-music-for-mechanical-organ-clock/

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- **Ted Fletcher ~ Rotary Table controlled by an *Arduino* Microcontroller.**

Ted showed his rotary table. The rotary table can operate either vertically or horizontally. It is controlled by a stepper motor. This motor goes around in steps. The motor was £5 - £6.
The microcontroller that drives it all is an *Arduino*. It was designed by an Italian. The design is 'open access' which means the controller can copied legally. The microcontroller costs about £3.
The system is all on 12 volts. There is a keypad for manual selections.
Ted developed this system for gear cutting. In the past when gear cutting you had to be really diligent, counting the gears cut. You could end up with a tooth missing or a thin tooth and the gear was then scrap. With this equipment the gear can be made accurately. By use of the keypad, angles can be selected which give the number of teeth.
The keypad allows for odd numbers of teeth on a gear. For example, if 23 teeth are required on a gear, the keypad can be selected for 23 divisions. All the programming came off the internet. The total cost of the system is about £20.

The operation of the rotary table operated by the Arduino can be found at this link:

https://www.youtube.com/watch?v=LT3VZMEKdi4

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- **Chris Irvine ~ Historic Aircraft Carburettor and Model Jet Engine.**

Chris said that his interest in aircraft and engineering runs like a thread through his life. His earliest recollections from an aviation point of view was when he went to the Finningley Airshow when he was four and seeing the *'Vulcan Scramble'*, where three Vulcans took off down the runway at the same time. This made a big impression on him. Similarly seeing the Spitfire and Hurricane displayed the heritage of the RAF.
Chris has always been interested in how things worked and meddled with electricity and machines. In his school days he was introduced to the lathe and the metal workshop. However, the machines were old and not very accurate for building steam engines. Chris then built his own workshop in an air raid shelter, and began to accumulate skills, bought a welder and started joining bits of metal.
There was an air museum in Swinegate York where they had engines from air crashes, for example a pair of Junkers *Jumo* engines from a Heinkel which crashed just north of York. There was also a *Merlin* engine from a *Barracuda* which had crashed on Whernside in the Dales just above the Ribblehead viaduct. They had it partially

dismantled in the museum. The rocker covers were off and you could see the two banks of twelve cylinders. It was a masterpiece of engineering.
When Chris realised that this type of engineering could be found on the moors, he was caught up in the world of aviation archaeology and had a particular interest in large piston engines. Chris has visited hundreds of crash sites around the country, from Wales to the south coast up to the Outer Hebrides. He has been to the Orkneys looking for crash sites and investigating them. It was a tribute to the RAF crews who had operated through an important period of the country's history.
Chris went on to collect not only components, but whenever he could find them, full size piston engines of which he has a collection. He also has a collection of full-size jet engines.
Forty years ago, Chris bought a lathe and was going to build model aircraft engines, but found he could still actually buy full size engines. Chris is currently a 'frustrated' model engineer, but has built a workshop and has equipment so may go back to make model engines. In the meantime, Chris has learnt how to cast metals, turn and weld and silver solder joints of various types. He hopes to restore some of the full-size engines he has.

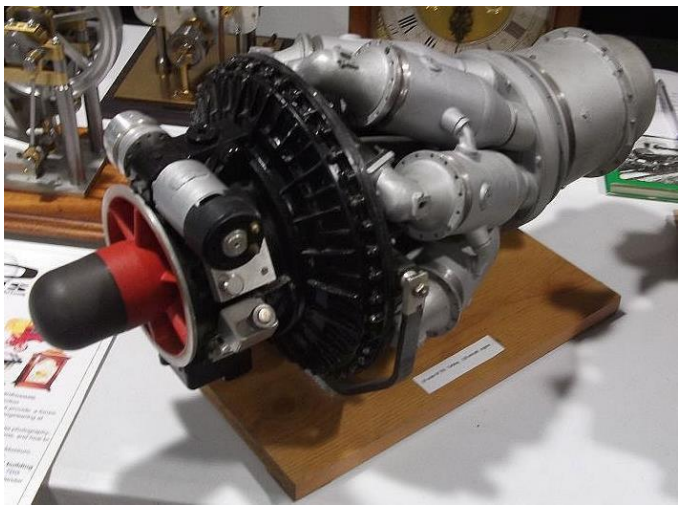
- **Stromberg Carburettor**

One item on display was an American *Stromberg* carburettor. This type of carburettor was used on almost every American engine that was produced during World War 2 and some British ones. It was a solution to a problem some of our Spitfires suffered from in the Battle Of Britain, notably carburettors with float chambers. The German aircraft, having fuel injected engines could turn their aircraft inverted and dive, or just push their nose down and dive, and the RAF aircraft couldn't follow as their engines sometimes cut out. This was caused by the float chambers lifting under negative G forces. The Stromberg carburettor doesn't have a float chamber and relies on the balancing of fuel pressure. The job of the carburettor is to make sure that the engine runs in all circumstances, and has the right amount of fuel. This is automated with a system of valves and barometric devices which make sure the engine is running under optimal fuel conditions.

The Americans produced a lot of carburettors, not just for themselves, but for Britain and Russia too. The production rates were prodigious at all times and there was a fantastic development of factories in America and Britain. There was never any shortage of *Merlin* engines because plans had been put in place at Fords and Packard in America to produce them.
The *Stromberg* carburettor and others like it were fitted to all the American engines at the time.

- **¼ Scale Czech M-701 Turbojet Model**

Chris wants to start model engineering seriously and the other engine on display was one he bought off another PEEMS member John Heeley. John built two Rolls Royce *Derwent* engines and decided as a further project to build a ¼ scale Czech M-701 turbojet model. Its design is like the *Derwent,* because just after The War the Labour Government sold Rolls Royce *Derwent* engines to the Russians. This probably gave the Russians the biggest boost in aviation that they'd ever had.



A price was paid because the *Mig-15* fighters in the Korean War performed better than expected, courtesy of Rolls Royce. Chris believes they copied the Rolls Royce engine design without paying royalties on all the changes. After the collapse of communism, when Russia wanted to buy Rolls Royce engines, a deal had to be reached to settle that account.
The ¼ scale model was built as a working model to run on propane or butane, rather than the kerosene jet fuel that would normally be used. It is currently short of the internal combustion chambers, the fuel pipes, and some of the accessories below, which provide oil cooling. This is a project which needs to be 'brought on'.

The technical information that John based it on is on-line. The turbine and compressor blades have been made and 75% - 80% of the work has already been done.
Chris already has some small jet engines, but his real interest is big piston engines. He wonders how long some of the *Merlins* on current Spitfires will keep going, as spare parts will become more expensive. At the end of The War, when Chris was looking for aircraft parts, suppliers were prepared to sell brand new *Merlin* engines for £5, and the packing crate was worth more to them because of the shortage of building materials.
At the time, Spitfires were even driven over by bulldozers to crush them to make it easier to load them onto a lorry. The engines would be removed and sent to the smelters. Chris managed to save four or five of them from the smelters.

- **Mike Sayers ~ ⅓ Scale 3-Litre Bentley Engine Model.**

Mike said that he was only interested in old cars, noisy cars, and cars that go fast. In the 1980s, Mike spent quite a time racing vintage motor cars. One day in 1989, a friend rang to say that he was clearing out his garage and that there was a lot of stuff that Mike could make use of. When Mike got the items home, there were a lot of detailed parts such as axles, brakes etc. for a 1923 3-litre Bentley. Mike had the options of scrapping the lot, giving it away or find all the remaining parts to rebuild the car. His friend, however had used the remaining parts to maintain his other cars. Mike therefore had to search around to find a chassis and the remains of an engine. Later on, Mike realises that in Cropton quarry there was a rusty chassis, which turned out to be for a 3 litre Bentley! Just after The War, Italian prisoners of war were billeted at Eden Camp and transported to Cropton quarry in an old Bentley converted to a bus, to work at the quarry. It was rolled into a ditch one night and was wrecked. This was left in the quarry to rust away. Mike rescued the chassis from the quarry and from 1990 to 2000 managed to recreate the whole car as a working, accurate and useable vintage Bentley.
Mike has been used to all sorts of vintage cars that he's raced and this Bentley was 'pedestrian' in comparison. It is a touring car and slow. It was an early Bentley with brakes on the back wheels. However, the more he drove it, the more he came to love it. It was completely reliable. His first venture out with it was a tour of Ireland rally. At the time, the car wasn't quite complete, for example there were no rear mudguards. Two weeks after he registered, he was touring Ireland in the pouring rain and the car never let him down. He was getting to love this car more and more.
In 2000, Mike and his wife treated themselves to a really good holiday. For Mike, a 'good holiday' had to include the car! This meant shipping the car to the U.S.A. They shipped the car to Los Angeles on a 'roll-on roll-off' ferry. Six weeks later they flew over, picked the car up and drove it around all the western states, Route 66, and 'Death Valley'. The car didn't let them down during the holiday even though Mike had taken tools and spares. The car was so reliable, it could go anywhere. The car has been 'off road' and up mountain tracks. After this trip they took the car to South Africa. It was shipped to Durban, and they drove it to Cape Town before shipping it home. Mike has been all over Europe in it and has travelled thousands of miles and the car hasn't let him down.

Out of respect for the engineering and design of the 3 litre Bentley, particularly the engine, Mike decided to build a model. He built an absolute replica of the 3-litre engine in his old car.

Mike has made every component using drawings from the *W.O. Bentley Memorial Foundation.* For other parts he begged Bentley owners for photos of spare parts that could be measured. The results that every component is the same as in his car.
Eventually when all the parts were assembled and he was testing the engine, he had the engine fitted into his milling machine in order to rotate it to check the water pump and to make sure the oil pressure worked, and realised the engine might actually run. He squirted some fuel into it, and the engine burst into life straight away. It works beautifully.
The *'Bentley Drivers' Club'* which is associated with Bentley Motors got to hear of this and the suggestion was made that Mike should make another one. The 3-litre model took 10 years to make (it took 10years for Bentley to mage the actual engine). The thought of building another engine was daunting. Mike thought, however, it would be good to make the first engine Bentley had produced in 1921, and the last 4 cylinder they produced in 1929 (the latter engine was instrumental in 'breaking' the company in 1931).
The model on display was the 1929 4½ Litre supercharge 'Blower' engine that Sir Henry Birkin put together for the 1929 Le Mans race. This particular engine was real 'bone of contention' between Birkin, Villiers (who designed the supercharger) and W.O. Bentley who didn't agree with the car having a supercharger on it. It ended up in a huge law suit. Bentley thought that the entry of the car into Le Mans had forced him to make another 50 cars, for what is called *'homologation',* because these were touring cars not specifically racing cars. The car didn't win at Le Mans, however 'The Blower' has become the iconic vintage Bentley.
Mike hasn't run this engine, simply because he was in a race to finish it for the 100th anniversary of the Bentley marque. Bentley started in 1919 and the centenary celebration for Bentley owners was last year. Mike was proud to have this engine as the central attraction for Bentley's centenary year. He hopes to have it running next year.

Q Are you still running your original Bentley?

Mike Yes. You don't have to pay road tax, but it is regarded as being a polluting vehicle so can't be driven in certain cities. Touring in France is now becoming more difficult as many cities don't allow entry for vehicles with old engines.

PEEMS would like to thank *Mickle Hill* for allowing them to give their presentation to the residents in order to share with them what opportunities joining a club like theirs would give them.
Thanks are also given for the provision of the welcome tea and biscuits.

Items For Sale

There are a number of items for sale, belonging to Ian Bryce.

They are currently in the committee meeting room.

Please contact Jonathan Milner for purchasing or viewing.

All are new or as new except the small scribing block as shown in the attached photos.

Small vertical slide.	£30
Small machine vice.	£10
MT2 boring shank	£30
MT 2 stub milling arbour.	£10




Contact:
If you would like to contribute to the Newsletter, the contact is:
Nevile Foster Tel 01751 474137 or e-mail nevf123@outlook.com