NEWSLETTER April 2018

i) FORTHCOMING EVENTS

- **Workshop Morning:** Tuesday April 17th 10-12 noon. The post winter maintenance of the railway is scheduled for this workshop morning.

- **RVS Exhibition:** Friday 20th April 12 noon to 3pm. The RVS are having a promotional event. They are trying to get all the clubs and societies that meet at the RVS to have a table each to demonstrate what they do. This will give newcomers a chance to see what is available at the RVS. This meeting was originally scheduled for March but was cancelled. The actual exhibition will be from 1pm to 3pm, but we need to arrive at 12 noon to set up. We need exhibits. Hopefully we have some stationary engines, but we need a third person in case David Hampshire can't turn up. Hopefully that person would bring exhibits which are not related to stationary engines or garden railways.

- **Club Meeting:** Wednesday 2nd May. Arrangements for Doncaster Model Engineering Exhibition including stewarding.

- **Doncaster Show**

  Wednesday 9th May Loading Vehicles For The Doncaster Show

  Thursday 10th May Doncaster Show Setup Day (Arrive at 10.00am)

  Friday/Saturday/Sunday 11th/12th/13th May Doncaster Show

- **Workshop Morning:** Tuesday 15th May 10-12 noon

ii) Club Meeting Wednesday 4th April

Prior to the excellent talk by Rebecca Ellis, Chairman David Proctor made these announcements:

- **Subscriptions:** Everyone who is going to pay has now paid. Anyone who has not paid will be removed from the list, but can attend as a guest.

- **Annual Dinner:** There were fifteen participants (members and partners), and everyone had an enjoyable time in lovely surroundings. It does, however appear to be of minority interest. PEEMS are looking at having a lunchtime event, possibly in Scarborough, and possibly linked to the outing to the "Flowers Of May" in mid to late July. About twenty people showed an interest in this event at the meeting. The format on the table is that lunch is taken somewhere, and there will be a guided tour of the "Flowers Of May" technical attractions.

- **The Railway**

  Three outings are planned for this year:

  a) Welburn Hall School ~ 26th June
  b) Malton Show ~ 1st July
  c) Ryedale Show ~ 31st July

  The other details relating to the railway outings are included in the March Newsletter.

- **Amotherby School:** PEEMS went to Amotherby School to support their Science Week. PEEMS members enjoyed it, and we think the children did too. The rocket launch was a spectacular success.

- **Outings :** PEEMS members have had their trip to the NYMR MPD shed. There was good weather, and fortunately the MPD were using the steam crane to lift the boiler of the steam locomotive "Eric Treacy"

  Parkol Marine Shipyard Whitby: PEEMS have been in contact with the Parkol Marine shipyard and they are able to host us for a visit towards the end of September. Exact details will be published later on.

- **Visits to Members' Workshops and Gardens.** This has been done in the past, but not recently. This is still being organised, so watch this space.

- **Safety Officer :** We still have a continuing vacancy for a Safety Officer, and we need someone to fill in the forms for the activities we do.

- **GDPR ~ General Data Protection Regulations**

  These regulations come into effect on the 25th May. This affects PEEMS as an organisation, as it does many other small organisations, in terms of how data from members is handled.

  Data includes names, addresses, telephone numbers, e-mail addresses etc.

  The conditions on the surface appear quite onerous, and it the question is should the conditions apply to an organisation like PEEMS. This conversation is probably happening in small clubs up and down the country.

  The GDPR regulations have been discussed in committee, and how PEEMS might comply with them.
  The N.A.M.E (The Northern Association of Model Engineers) AGM occurred the weekend following the club meeting, and David was attending.

  There will be an agenda item for this. Hopefully a lead can be taken from them, if there is a coherent strategy and a policy that PEEMS can adopt.

  This will need to be considered in the next committee meeting.

  Postscript

  David attended the N.A.M.E. AGM, unfortunately no direction or guidance was obtained from the N.A.M.E. officers. The way forward will need to be discussed at the committee meeting, and members will be informed of progress.

Rebecca ('Becci') Ellis ~ Fastest Woman In The World On Two Wheels, On A Conventional Motor Cycle.

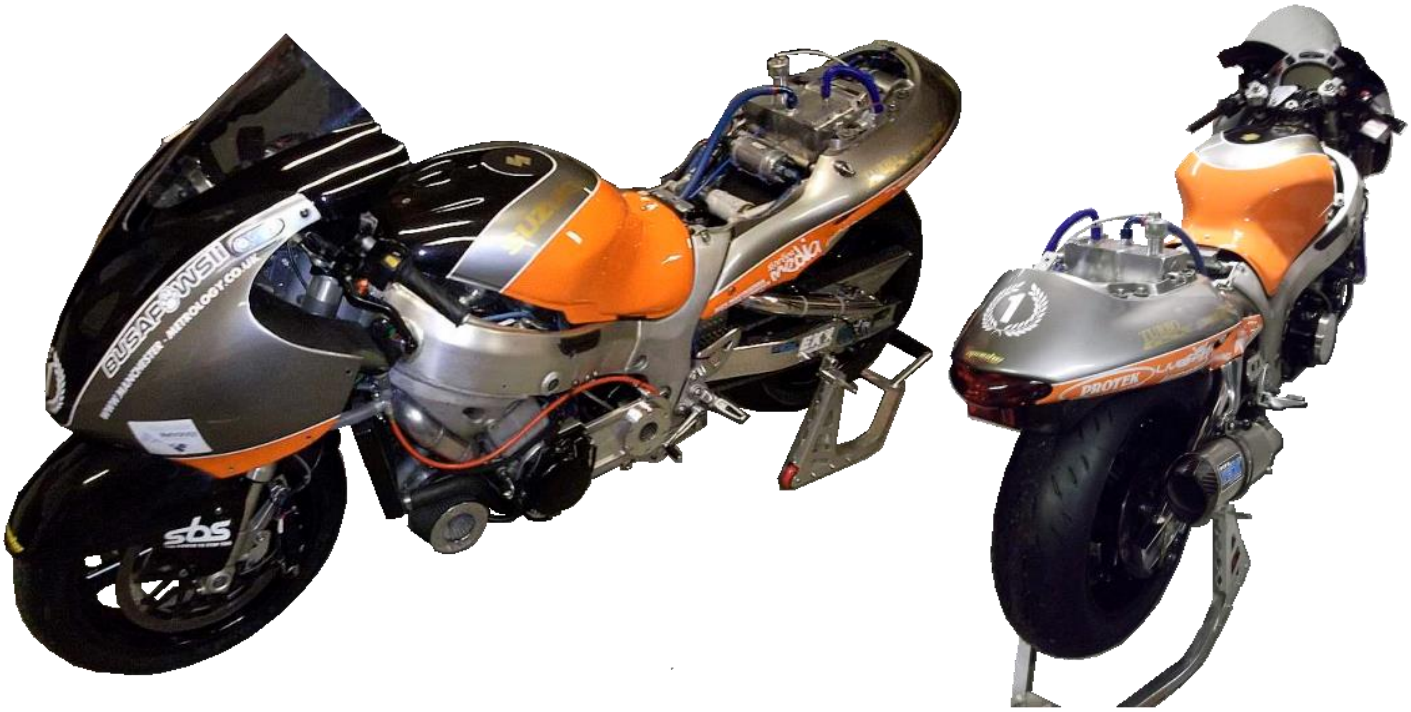
Introduction

Rebecca ('Becci') Ellis, gave a fascinating, very informative and inspirational talk about her quest to not only break the world speed record for a woman on a conventional motor cycle, but to increase the speed beyond the record by a large margin.

The underlying theme of the evening, was that goals (and dreams) can be achieved, in spite of potentially catastrophic events getting in the way, and you should always persevere and never give up.

From an engineering point of view, the team's speed record programme demonstrated that by building on knowledge gained during a ten year development period, with great attention to detail, and a commitment to exceed personal goals, not only have world records been broken, but innovative design ideas have been fed back into the motorcycle industry for the benefit of all.

As the slide at the beginning of the presentation said: ***"NO BIG BUDGETS, NO MAJOR SPONSORS, NO HIGHFALUTIN' PRESS RELEASES OR CELEBRITY ENDORSEMENTS. JUST HARD GRAFT, COMMITMENT AND A WILL TO SUCCEED. OH, AND A WORLD RECORD TUCKED NEATLY IN THE BAG…"***



Becci's Latest Bike The BUSAPAWSII (without the fairing or seat), On Display At The RVS Pickering

In The Beginning

Becci said that since being a small child, one of her biggest passions had been motor cycling. Her older brother had motor bikes and Becci wanted to be a biker too. From helping her brother with his bike, even riding pillion, she wanted her own two wheels. She eventually convinced her parents (begrudgingly) to let her have a motor bike. She bought a Honda C70, went on to pass her test and then bought a big bike. She loved it so much she asked to help out at the training centre. She then became an instructor with a group associated with The Institute for Advanced Motoring. They taught her so much about motor cycling that she ended up with a dream job teaching people how to ride motor bikes. She taught the whole spectrum from children on off-road dirt bikes up to adults wanting to ride on the roads.

Brown Dog Racing Team (BDR).

She met her future husband Mike who was drag racing all over Europe, and at the time held World Records. This inspired Becci to take up drag racing. She got a Suzuki RGV250. Mike helped and coached her as she went along to drag racing events.

In 2008 the team was drag racing a Suzuki Hayabusa, which Mike had built and developed. They used to buy parts for the bikes. However, it was found to be cheaper to buy a whole bike and strip it down, than it was to buy an engine and components separately. They found the original Suzuki 1300cc Hayabusa at a scrap yard. It was offered for £3000. They thought they could strip it down and sell off all of the bits. They went to a meeting at Woodbridge where there were land speed attempts taking place. Becci asked to ride the unmodified bike, which she hadn't ridden before. The first time out on the Hayabusa, awarded Becci the "Fastest Lady" trophy with an impressive 183.4 mph. This was a big boost for Becci, but Mike lost his bike for spare parts!

2009 saw Becci reach a speed of 193.4 mph at Elvington airfield near York. Elvington seemed the place to be. Over the next few years, Mike and Becci worked on the bike in order to get the best out of it with minor modifications. They didn't want to spend a lot of money, and Becci wanted to try and get a record with a naturally aspirated bike, without any extra turbo or nitrous. For a number of years Becci rode the Hayabusa, managing to be awarded a "Fastest Lady" award at each event. However, she had reached a plateau, with speeds varying around 193-195 mph. She was getting frustrated.

In May and June 2013, a friend, Tony Foster, offered her a ride on his turbo Hayabusa bike. Tony was part of the BDR team. Tony's bike had been built by Mike. Tony didn't want to ride at the event, but offered the ride to Becci. Becci achieved 231.1 mph, an increase in speed of 36mph on her previous top speed. Becci then wanted a turbo bike for herself. Sadly, Tony died in a crash at Elvington in April 2014. He was trying to achieve a personal best of 230mph on a second turbo charged race bike. It had a massive impact on the team. It took a year to find out it was a mechanical failure. Becci said that although it had been a shock, Tony had died doing something he wanted to do.

Mike had spent Christmas 2012 to August 2013 building a new turbo charged Hayabusa for Becci. They then went to Elvington to run the bike in. In September they went to Woodbridge where Becci managed 227.3 mph even in wet conditions. They knew the bike could achieve more but were glad they had the winter for discussion about strategy for 2014, as Becci was now looking at World records.

World Records.

One American lady had achieved a record of 243.6mph. Becci believed she could go faster. Because of the feedback from Becci to Mike, the team could work with the bike. They were using a MoTeC ECU Engine Management System (more details later), which produced data that could be analysed by computer.

At the first record meeting of the season, in May 2014, they went out again, and were doing 'two way' runs when Becci broke the British National Record of the Speed Record Club at 233.21 mph. This is the average speed over two runs.

The second run had to be completed within the hour. Becci was the first woman in that category, the first being Donald Campbell.

On the 17th June 2014, Becci broke the World record by 5 mph at 248.5mph over a standing start measured mile at Elvington. She became the fastest woman on a conventional motor bike. A scary but amazing experience. The bike had a boost system, developed by Mike over a number of years, and this system uses all the boost. Becci believed the bike could go faster.

There was a lot of media interest, an example of which is shown here:
https://www.youtube.com/watch?v=m43soG3wSDI&t=2s (please press back arrow ⟵ to return to the newsletter)
In August 2014 there was the World Wheelie and Top Speed Records, where Becci broke her own record four times. She achieved the previous record of 248.5mph during the initial 'shakedown'. The sequence of standing start measured mile runs follows:

First Day:	Run 1 – 248.5mph	Shakedown run
	Run 2 – 260.4mph	New World Record. (The bike was set up for 250 mph)
	Run 3 – 257.9mph	Gear change shakedown
Second Day:	Run 4 – 261.6mph	New World Record
	Run 5 – 264.1mph	New World Record

Here is moment Becci hit 264.1 mph : https://www.youtube.com/watch?v=y8tw1QY4ZJ0

When Becci was going home she learnt that she was the fastest woman in the world by an increase of 20mph, which was the biggest increase since 1976. She was also the 4th fastest human on a motor bike in the world being just 30mph slower than the fastest standing start measured mile at a 297mph record. After four years she still is. She is also around the 9th fastest human in the world in any vehicle, which includes vehicles going 600 to 800mph.

In 2015 they had new challenges. Becci believes the bike has the capability of 270mph plus. With a few changes on the bike over the winter period, at the first meeting in March she was happy with the bike's performance. In April she achieved 247.6 mph.

At the British National Records in May 2015, which takes the average speed of two runs, Becci achieved 263.75mph, on the first run, very close to her original record. If you want to feel how fast that is, here is a video from a camera on the bike: https://www.youtube.com/watch?v=Wdv2vVNCVuY (please press back arrow ← to return to the newsletter)
As she was slowing the bike down at the end of the run, in order to turn the bike around for the return run, there was a 'knocking' noise from the engine. The record attempt had to be abandoned unfortunately, so wasn't part of the record. After they stripped the engine down, they found one of the valve guides had broken and was sitting on top of the piston. If nothing had gone wrong, Becci believes that she would have been looking at a 250mph record at least.

The bike was then spruced up for the August meeting of the 'World Wheelie and Top Speed Records'. The team were happy with the running of the bike, the weather was good, with the exception of a few side winds. Becci achieved 259.54mph on her fourth run, and was hoping for a speed of 270mph, which was the record she really wanted. Unfortunately, disaster struck. At 254.7mph, just before going through the timing lights, a side gust took her foot off the foot rest, and it was dangling behind her. She found she couldn't pull her leg back because of the speed. She was struggling with the bike. In trying to get her leg back up, she leaned out to the side, and the wind caught her and sat her upright on the bike. She was getting to the end of the runway, and her instinct was to get off it and onto the grass.

She ran off the runway at 165mph for about 300 metres, in a straight line. It was a bumpy ride until the bike couldn't go anymore. Becci thinks the bike got stuck in a mole hill, and she was catapulted off at 100mph. She landed on her front and slid for about 60 to 80 yards. Becci was fine, except for a broken ankle and bruised ribs. The bike however, was completely wrecked, which upset her. The team picked up the bits. The only piece missing was the MoteC ECU Engine Management System, which is referred to as "The Brain" as it controls the engine and regulates fuel, oil pressure and boost. As this was classed as a high speed accident, Becci was flown to hospital by Air Ambulance. Meanwhile everyone was looking for the MoTec unit. Fortunately it was found with help from the York Metal Detectorists.

The team managed to save the engine and the turbo. There was just some cosmetic damage to some of the edging parts of the turbo which were repaired. The engine was fine. They needed, however, everything else and people were ringing up and offering parts and components. Because of the support she was getting, Becci felt obligated to get back on the bike. There was also the possibility in her mind that if she didn't get back on, she never would. She had a cast on her leg when she visited Elvington again the day after the crash, and would have loved to have got back on a bike there and then, but obviously couldn't.

The team rebuilt over the season, and in 2016, with the newly built bike BUSAPAWSII, Becci and the team were overwhelmed by the help, and support they were receiving from friends, supporters and new sponsors in getting her back on the track at Elvington.

Becci said that the Yorkshire and Lincolnshire Air Ambulance had played a big part in saving her life. The injuries could have been worse, and no-one knew the extent of her injuries (neck and back injuries were suspected), until she was taken to hospital. For this reason, they decided to launch the new bike at the Air Ambulance site in Wakefield. There was also a big "Reveal" at G.T. Motorcycles in Plymouth.

During 2016/2017, Becci hasn't gone as fast as previous seasons, as they had to build the new bike from scratch. The team are performing extra procedures and modifications to the bike.

In 2017, Becci did take the bike to 249.4 mph, but the weather had been very wet. Becci will not ride now with side winds, and she warns other riders about it. Most riders are alright because they are on standard bikes or bikes with smaller turbos. Becci rides all sorts of bikes during the season.

The team kindly brought the BUSAPAWSII to the PEEMS meeting at the RVS, so that members could inspect it:

Here are some of the technical details of the bike:

BUILT AND PREPARED BY BDR PERFORMANCE ENGINEERING 650BHP + TURBO HAYABUSA USING 119 OCTANE FUEL, WITH PROVEN TOP SPEEDS OF OVER 264.1MPH

- **SPECIFICATIONS - 2015-2018**

- **ENGINE: Original**
- Gen 1 Suzuki Hayabusa 1300cc (original Engine from BUSAPAWS 1)
- Garrett GT35 turbo (Original supplied by GT Turbo's)
- Flowed & polished cylinder head
- Woosner low compression pistons
- Carrillo conrods
- Balanced crank by Alex Macfadzean Balancing Services
- Undercut gearbox,
- Billet output shaft, with BDR Outrigger
- Billet selector shafts,
- Upperton lock-up clutch
- **New** redesigned Intake charge cooler,
- **New** Standard spark plugs,
- 900cc injectors
- Original Bosch fuel pump
- Remote oil filter
- MoTeC M400 ECU & Datalogger (Supplied by BTC Motoronics)
- **New** Motec Dashboard (Supplied by BTC Motoronics)
- **New** Complete rewire by Mark Wells
- **New** BDR exhaust pipes
- **New** Silencer by Pipe Werx
- 650bhp plus
- Using 119 octane fuel.

FRAME:

- **All New** standard Hayabusa frame & subframe, steering geometry altered by John Warrington Motorcycles.

FRONT END: All New Except PFM discs and callipers

- Standard forks, yokes and wheels, forks raised through yokes to lower the front, SBS Pads, PFM Discs and Callipers.

REAR END: All New

- Swinging arm 4 inch longer than standard, machined by Graham Sykes Performance Engineering, Nitron shock, Standard wheels, Standard disc & calliper with SBS Pads, EK drag racing chain, All steel (one off) selection of sprockets, various machining by Dave Taylor and Tom Armitage.

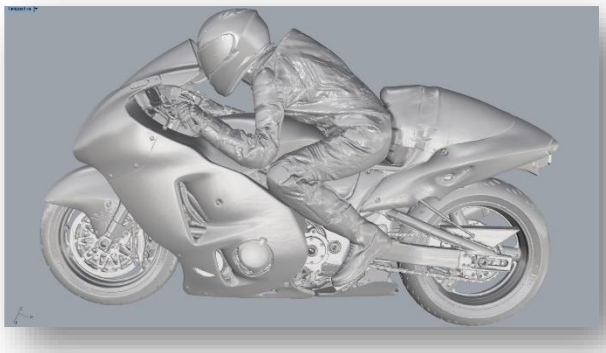
BODYWORK: All New

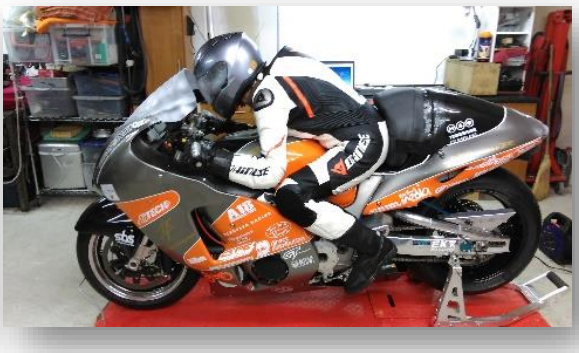
- Standard Hayabusa bodywork, race nose panel with no headlight or indicator cut-outs, plus aftermarket seat hump.
- Also in 2016, full race fairing supplied by AIRTEK, USA.

PAINT: All New

- By Apache Paints, Scunthorpe.

In 2018, the team have been looking at the aerodynamics of the bike in order to improve it further. They were put in touch with “Manchester Metrology” through another member of the Land Speed Racing community. The bike has been scanned with a scanning arm. The £100k worth of equipment was taken into Mike and Becci’s garage, and the bike was scanned with Becci sitting on it. Becci had to sit still for the full 40 minutes of the scan. The complete scan took 2 full days. This information will be sent to Northumbria University in Newcastle so that a 1/3rd scale model can be built. The scanned data from the bike can also be used in a virtual wind tunnel. Becci thinks this is timely, as she is generating a vortex at the back of the bike which causes a little instability, making her lean. This is why she needs the aerodynamic information, and why she appreciates the sponsorship which allows her to do this. The information is crucial, and when they work out the best way to run the bike, she believes this will lead to further success.





Finished Scan

Here are the BDR Performance Engineering Team who support Becci:

- Mick Ellis - Team Crew Chief and bike builder
- Rick Stubbins - Motec and Engine Management
- Mark Wells - Electrical Engineer
- Alan Brown - Mechanical Engineer
- Andy Gilderson - Tyre Technician
- Maxine Taylor - Catering & Entertainments Manager

Mark Andy Mike Rick Alan

Question And Answer Session

There followed a question and answer session:

- One member had a great concern that 650 HP was being put through a ¾" roller chain.

Mike: This is a very heavy duty EK chain made in America, and more than 650 HP can be put through it. The team was going through a lot of chains at one point, but this was because they were trying to use new sprockets and chains all the time. What they were finding was that the rear sprockets were so new they were not matching perfectly to the chains. Because of the power being put through them, they were wearing in and out straight away. This meant that £160 worth of chain was gone in three or four runs, along with £160 worth of tyre, which was normally specified to last for six runs. John Brown Engineering in Boroughbridge makes sprockets for bikes, and BDR have got him to machine in a little of wear. The same chain now lasts for two meetings.

- The next question from the floor asked whether the tyres used would be good for 270 – 280 mph.

Mike: This is a good question. BDR's sponsor 'Direct Distribution' approached Michelin. The team had helped Michelin develop the tyres, giving them the feedback with regards to temperatures, distance and power for each run. Once Michelin knew the bike was travelling at 264 mph, they carried out an investigation, sending a tyre to their workshops in France for a strip down. The investigation found there were little pockets of glue which had melted here and there. Michelin then specified twelve runs for each tyre, but Mike would only allow six. BDR have been quite successful with that criteria, and when people asked what tyres were used, they were pointed in that direction. The Michelin lawyers then became concerned that if there was a fatality it wouldn't be worth it so 'pulled the rug'.
BDR have help with standard tyres now, but they had helped Michelin develop the EVO tyre which lasted two years until the new EVO Pilot came into production. BDR are asking Michelin if they can use these.

- A member asked how the Boost Pressure was controlled.

Mike: There is a speed sensor on the front wheels so the speed is known at all times. If the front wheel comes up in the air for any reason, the boost will not increase, until the wheel goes back down. That information is fed back into the ECU. The boost is adjusted by a chart in the MoTeC logs. As the wheel speed goes up, the boost goes up. If the back wheel spins, the front wheel doesn't go any faster, so the boost doesn't go up, which is probably a happy coincidence. There was a situation when Becci pulled a front wheel up at 218 mph, while changing into top gear. There wasn't a problem because the boost didn't increase. The good thing as well is that the boost doesn't suddenly increase during gear change. The system BDR uses means the boost is really smooth. If the gear changes by retarding the ignition, ie. maintaining full throttle, keeping in gear, using the shift cylinder behind the gear selector, and retarding the ignition at the same time. Still firing, still boosting, still got oil pressure, but easing off on the gearbox when the gear goes in. It sounds almost like an automatic when the gear goes in. That stops the boost dropping.

- You are running a maximum of 28lbs boost. What is the static compression ratio, and are you running with special fuels?

Mike: Static compression ratio is 9.5. We are using two types of fuel Sunoco (119 octane), and VP (118 octane). The VP fuel leaves everything bone dry, valves stick in the guides, and injectors stick and can rust if the bike is left and you're not careful. That doesn't happen with the Sunoco fuel. Maybe there's lead in there, but I don't know. With Sunoco, the tank and injectors don't need to be drained, and leaded fuel put in.

- At Elvington, how many seconds does it take to go from start to finish?

Becci: My fastest run took 19.5 seconds, from a standing start to going through the timing lights at the end of the measured mile, that is 0 to 264 mph.

- What is the slim blue strut on the rear suspension?

Mike: That is for collecting data to tell us everything that the suspension is doing, for example how quickly it is moving up and down. The data is stored in the MoTec ECU unit for further analysis.

- What are the cylinders right at the back of the bike for?

Mike: That is compressed air to run the gear change system. There are two cylinders just to make sure. They are pressurised to 150 psi. After the fifth gear change, the pressure has only dropped 5 psi.

This was an excellent evening and PEEMS would like to thank Becci, Mike and the rest of the team for making it so informative for us.

Many thanks to Becci and Mike, for proof reading this article and providing corrections.
Permission has been granted to use the BDR photographs by Becci Ellis Photography SMC - Mark Nightingale SMC Photography - Paul Fishwick Photography - Adam Duckworth Photography.

Steam Bike At Elvington

Paul Windross sent this letter which he thought would be of interest to PEEMS members :

I was at Elvington Straightliners speed meeting and a steam bike from the Isle of Man was there.

It was the first time it was running apart from around an industrial site.

The weather was wet most of the day, but it managed two successful runs.

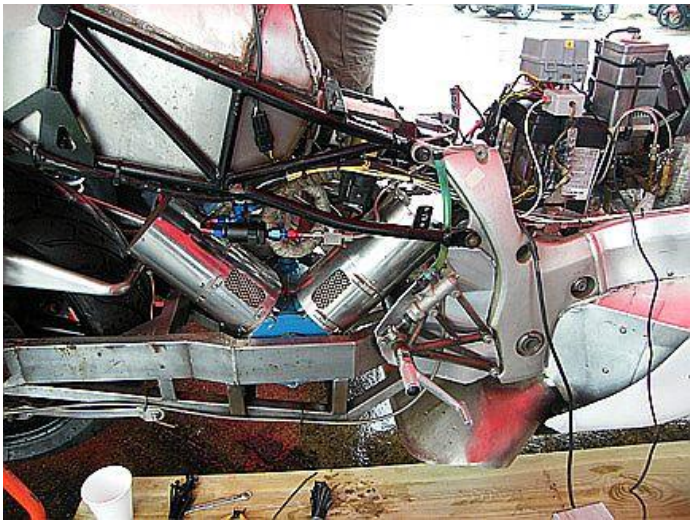
The first run was at 49mph plus, and the second run was at 72mph plus.

The third attempt had to abort as something was not right.

Paul included some photographs which are shown below.

Editor's Note: Manxman Chris Wedgewood's bike is a heavily modified Suzuki Hayabusa, which runs a contraflow steam generator. This uses kerosene as a fuel to produce 2000psi at 950°F.

This bike was at Elvington to try and beat the world record for a steam bike, which is 80.4 mph set by American Bill Barnes in 2014.



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