Project Moth - Change is Good 2018

This is Part 2 of **Project Moth** – Change is Good 2018.
If you have not done so, you may like to look over Part 1 for a background of my entry into the International Moth Class. Enjoy...

Time for Upgrades

After my first season in 2017, I was happy that my basic **Bladerider (BR)** package had served me well enough to learn the basics of foiling and not let me down through breakages. The boat was better than my abilities, but in looking forward I felt some further upgrades and reinforcements could be made to make sure things stayed that way for 2018 and help improve my performance.

Of the upgrades I had planned and others that were on my wish list, these all required clear thought to understand any knock on effects. For example, a rudder upgrade would be simple swap provided the gantry height at the rudder pin was similar to my existing setup. Changing to an incompatible mainfoil on the other hand could mean a new fin box and different pushrod system in the hull with added time and costs associated. The right choices needed to be made...

I gave it all plenty of thought and prioritised where I wanted to improve and modernise the boat in the below order:

- **Rudder**
  The original rudder package was outdated. The vertical was too short to allow the boat to fly level and the horizontal was considered large in area with a thick chord compared to modern low drag shapes. The vertical was prone to bend and twist and was housed in a rudder box known as a weak point and ventilated badly in colder water at anything near 20 knots. An obvious first priority for change.

  I had read and been advised by past **BR** owners that Mike Cooke had fitted a number of his Ninja rudder foils for a noted improvement in the UK. They were longer in vertical length and a horizontal that was improved over the **BR** ones. I was fortunate to be offered one of these, including the tiller and AOA mechanism that would fit straight onto my gantry for a simple upgrade.

- **Kicker Attachment**
- **Lowered Foredeck and Rig**
- **Bowsprit**
- **Mainfoil**

The next four upgrades were all interconnected. The priority upgrade from a preventative maintenance point was to strengthen the kicker/vang attachment area. An increase in kicker/vang loads being used on current boats meant that if I wanted to have a modern rig that could flatten up range, work needed to be done.

Current boats used a dyneema loop inside a solid carbon U shape tube internally around the mast stump, exiting through the bulkhead with the two open holes as low as possible on the floor. All simple enough until you consider the internal crushing load once the kicker/vang line is pulling back hard against the stump. Internal carbon tube sleeves would be needed inside the existing mast stump to take this load and more.

Sleeving the stump from below the kicker/vang loop all the way up to the mast stepping plug would give added strength to work with the lower foredeck and rig height that I wanted. Early Moth foiling days had seen rigs that once sat very high out of the boat progressively coming

down to reduce windage drag up high. Put simply, as the speeds of the boats were increasing, rigs were becoming more quickly overpowered through higher apparent wind speeds upwind.

Lowering the rig centre of effort and gravity of the same overall sail area resulted in a small power reduction in getting on the foils in marginal winds. The upside though was a big drag reduction in higher winds along with a rig that was easier to control for a net gain in performance. At the 2017 Worlds, some were experimenting on getting the rigs even lower with deck sweeper type sails, but for now my aim was to lower my stump and rig to current standard.

I had planned for an overall reduction of 120mm from standard with 60mm to come from reducing the stump height. The concern was that this reduces the effective kicker span and causes the kicker to load significantly higher for the same given mainsail leech tension. These added loads transfer in a number of areas from boom stiffness and attachment, kicker pulleys and purchase, mast stump strength, forestay tension and and foredeck compression to name a few.

A number of mast sleeves were glued into the existing stump down past the kicker point to give an 8mm wall thickness to accept these expected mast base loads. The mast would be shortened approximately 60mm to get the mainsail tack under max tension to be as low to the boom as possible.

With full access to the bow area, it was worth thinking ahead regarding control systems. Near all current designs had moved on to a bowsprit system for wand control, taking the point of relative mainfoil flap control further forward for improved control in heavier wind and waves. Pushrod systems had changed from the internal 2-2.5mm stainless rod systems, to full length carbon tubes in the 8-10mm diameter range for more direct control without flex. It was important if I wanted the option of upgrading to a modern foil that the system I put in was capable of working with them.

I used a length of thin walled tapered sailboard carbon topmast which would run internally to house the pushrod system. This would exit low at the deck end through the mast stump area and finished flush with the bow for the bowsprit to slide into. This tube, combined with added stiffening under the foredeck would also help to take the added compression loads of the higher kicker tension.

The final priority for upgrade was a better mainfoil. I had received advice on moving the fin position in the boat forward, but I decided to hold this for now after referencing current leading designs and their forward horizontal foil positioning relative to the hull length. By my best calculations, my current **BR** setup with a forward vertical fin rake of 7-7.5 degrees had the horizontal within 40mm of where the leading boats were, with a similar mast position also. For now, I didn't see this as a big enough difference for the added work required.

I was limited to finding a mainfoil that would fit in my fin case. Again I was lucky to be offered an early Mike Cooke Rocket foil that with a little work and a re-setting of the horizontal AOA would do nicely. The section shapes of both the vertical and horizontal were a big step ahead from my original mainfoil. The horizontal could be considered large but as I was on the larger side this would be good. As a bonus, I would also now have the ability to adjust my gearing ratio relative to the wand with the newer standard of adjustment at the head of the foil.

Happy that I was committed to the above, I thought on other areas I wanted to improve on if time permitted:

- Narrow the lowered foredeck by removing forward deck edge overhang for a less dated appearance

- Internally reinforce the front wing bar sockets at the hull join
- Make the wing platform smaller and stiffer by moving rear wing beam forward
- Move cleats for control lines to the floor similar to current boats for easier adjustments
- Kink existing boom

Satisfied that these added changes were ones that could be made without affecting the main priority upgrades, the plan was set in place with the rudder, mainfoil and a Dremel purchased for work to begin in November 2017.



Ninja rudder on left compared with the original Bladerider one. Rocket mainfoil

Time to Get Started

Before breaking the boat down, I felt it was important to check over and document existing systems to make life easy when the boat was being put back together. It was then on to marking where the foredeck was to be cut for removal. I left it as large as possible in one piece so that it could be modified and used again.

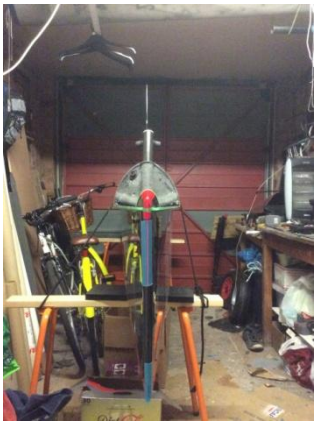
I was hoping to reduce the height of the stem by passing the bowsprit tube through underneath the forestay take off so I cut around this to start. It was later removed as not suitable structurally. Once the foredeck was off there was a flat internal deck foam/glass sandwich structure that was quite possibly a production fix to early boats having compression problems through the sides of the hull under rig load. This inner deck was removed, as well as the stainless pushrod housing tube.

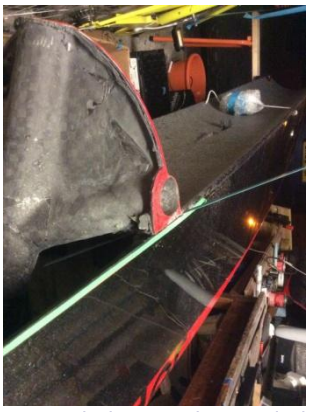
With the foredeck and inner deck removed, it became clear that the mast stump was off to one side on the floor. I set up a laser light vertically to get an idea if this was an issue. From checking over the foils earlier I was happy that the fin case and gantry pin to stem alignment were good. Using a carbon rod aligned vertically through the fin case as my datum with the boat upright, the distance that the mast base was out from the centreline was clear to see.

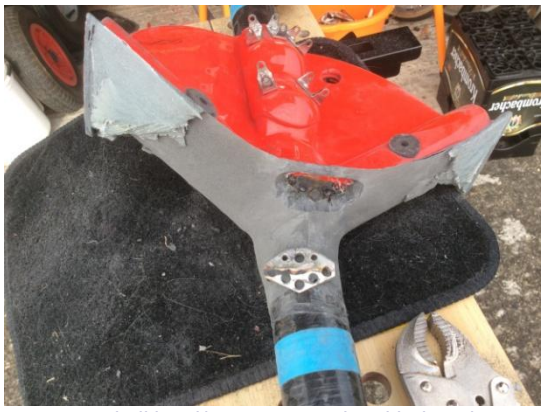
I looked at different ways in fixing this but as the mast stump, bulkhead and front wing sockets were all set in one solid moulding, I thought it best to keep this together if possible. I checked the wing geometry of the two front sockets relative to the stump and they were fine leaving only one solution. The bulkhead structure would need removing and re setting in alignment. At least this would make the kicker take off an easier job...











Foredeck removal, inner deck removal, vertical miss alignment of mast stump, bulkhead/stump removal and kicker plate removal

With the bulkhead structure now removed, this allowed me to sit in place the internal bow tube and fit the forward end. The bulkhead was now fitted back in position with the mast stump now aligned vertically with the fin case. The bow tube was fitted through the bulkhead at the deck height. With all pieces now in basic position, I could now start to look at how far the foredeck height could be trimmed down and narrowed in width.

In looking to remove the old deck edge lip, the foredeck needed to be split down the middle to reduce width and come down vertically, giving a clean join to the hull. This all happened easier than expected and gave me a guide to trim from the top of the bulkhead. The new foredeck was notably smaller and sat in place well.

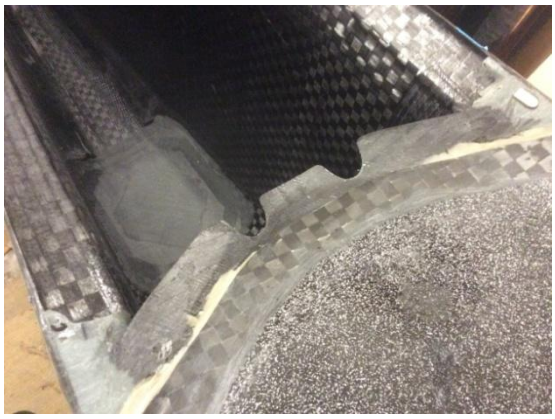
Split foredeck fitted in place. Bulkhead reduced in height and width to suit.

Happy now that I had a base to work with, some basic reinforcing was needed before it was all assembled. First the internal sleeves were added to the mast stump down well past the internal bow tube point. A landing was added to the underside of the cockpit floor for the bulkhead join to sit back on to. The floor area that the stump base would bond to was reinforced.

Assembly

With the bulkhead sat in place, the internal bow tube was glued through the mast stump in its position. This was then lifted from the boat and the kicker/vang loop laminated in place around the stump. Once set, and the waxed rubber hose removed from the carbon sock, a full wrapping of carbon tied the whole area together. This whole structure was now bonded into the boat.

Before continuing with the foredeck, I put the wing bars in the boat to check their alignment. The existing compression strut angle needed modifying to suit the lower mast stump. New struts were fitted and bonded into the wings in correct alignment to the stump at the correct height. The internal bulkhead and wing beam area were then strengthened with added foam gussets laminated in place to the inside of the hull vertical face.

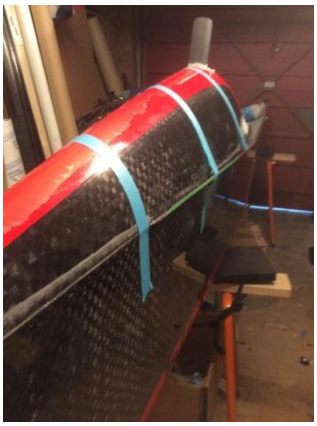



Internal bow tube glued to bulkhead then removed to laminate kicker tube. Deck landing to bond to and then structure bonded in place. Compression struts fitted at new lower angle. Reinforcement under wing points to hull.

Next was a landing for the foredeck to bond to. Being in two pieces this was a simple process of wrapping each deck piece in brown packing tape and positioning it in place, one side at a time. Carbon cloth was laminated to the internal join area with peel ply tape going over the taped area before carbon. Once dry the deck would come away from the hull leaving (after trimming) a nice landing to bond to after the peel ply was removed.

With the landing now done, the foredeck pieces were put in place and temporarily glued on the centreline of the top surface to hold in shape. This was now lifted off the boat and upturned to laminate the join along the inside centreline and reinforce with a laminated carbon former to take compression loads. The boat was now ready for the foredeck to be glued back in place which happened on the last day of 2017.




Laminated deck landing shaped. Internal bow pole braced to side of hull at mid point. Underside of foredeck joined and reinforced with beam. Foredeck bonded then deck edge cleaned down for external laminate.

A New Year - 2018

With the foredeck glued in place, the deck edge and bulkhead joining areas were ground and sanded down to the carbon skin for a carbon tape to reinforce the join. The sanding or grinding down and cleaning before any lamination is important on all areas of the modifications to get a good adhesion of glued or laminated points.

It was even more important on the **BR** as the boat had so much painted clear coat over it that you could easily be fooled into thinking you were laminating onto carbon, but were actually applying over clear paint that would easily fail...

The bow area had the exposed section of the internal bow tube wrapped with unidirectional carbon cloth to take the load of the forestay. All laminated areas were covered with peel ply for a clean finish keyed and easy to fair in. This bow area was then shaped along the last section of the centreline and faired in with a lightweight filler blend with all other laminated areas with the foredeck paint removed.


Bow area reinforced for taking forestay load through bowsprit and deck edge join laminated with peel ply covering

Wings

I decided the wing area reduction could also be done in the time for the first event for me at Grafham Water in April. The first step was to use the rear wing bar as a mould by wrapping a layer of 3mm foam and then brown tape over the centre section. A carbon moulding was then taken from this.

Next was shortening the outer wing bars by around 220mm for a similar wing area of current designs. The tubes were simply cut, with the existing end plugs removed from the off-cut ends and glued back inside the shortened bars, then wrap reinforced to avoid the tube end splitting.

The boat would need some reinforcement at the rear wing fastening area, but I was hopeful of not having to add internal structure. I thought that as long as the outside faces of the hull were reinforced and tied together through a deck frame it would be more than strong enough.

The trampoline track in the gunwale was filled with a carbon rod through the new mounting position and the whole area reinforced before the wing moulding structure was started. A vertical foam sandwich frame was bonded in place on the existing deck. The wings were then assembled with the rear moulding bonded in place over the top of the frame. This rear structure was then all laminated to the floor and sides of the boat.

Moving back to the compression strut area, a final external sleeve wrapped in biax cloth was bonded over the exposed mast stump. Two small receptive tubes were bonded and laminated to this, aligned with the wing struts. These were connected by a stainless steel spigot holding all in alignment in compression allowing the wings to be removed.

Rear wing moulding taken from tube. Gunwale and hull area reinforced before frame and moulding glued and laminated in place. External sleeve on mast stump to receive compression struts.

Deck Pads and Fairing

With the majority of the structural work completed, it was now onto the deck pads for control line turning blocks, cleats and the mainfoil fastening pin. All pads were made with solid 4mm carbon laminated shaped plate, bonded and laminated in place. The large cockpit pads for the control line pulleys and cleats were shaped foam with carbon solid pads fitted, then laminated on to the deck.

All deck pads and exposed laminated areas were now filled with a light epoxy filler blend and then faired. The old non skid took forever to remove as it was silica mixed into either paint or resin. The boat was now ready for paint over the modified area.

Faired and ready for painting

Painting

As someone who had only ever sprayed boats in the past I had a bit of a dilemma. Without spray painting gear and a suitable area I had two options. One was to source a painter familiar with two part polyurethane paint that would not lay the paint on heavy and as thick as honey. The other choice was to so it myself and roll/brush the paint on. This meant more hand work involved in the finishing but less time masking and travelling the country to find someone suitable.

The method I used was to go with the finish paint direct onto the surface without using any primers. This method is regularly used in one off radio yacht prototyping that proves every bit as durable, but just needs a good eye and patience to do it to a decent standard. The sides of the hull were masked with a pin line and then masking tape. The whole surface was cleaned down with thinners and then into it.

Over 3 days, three coats were applied over the main areas to be left glossed, flattened down between coats and then afterwards wet sanded to finish with 2000 grit paper. The clear glossed area of carbon on the hull sides were then polished to match into the new paintwork.

Next was the non skid area. This was masked in a pattern and done with the same method I used on 18 foot skiff decks for a number of years. These were usually done in clear coat over the top of sponsor signage. The method is to roll the area with two pack urethane in two coats, wet on wet. Once happy with consistent cover, you follow on top with a bag of sugar covering all areas without touching the wet surface.

With the paint still wet, the masking tape was removed then allowed to dry for a day. Once dry, I brushed away all excess sugar then poured warm water through the area to melt away remaining sugar. This left a non aggressive, lightweight and hard wearing surface, easy to sand away for repair work or re coating in the future.

Deck painted and non skid with granulated sugar on deck before washing off when dry.

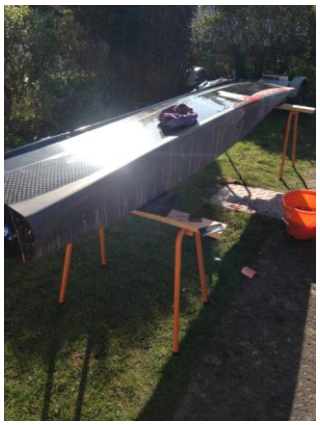
Fit Out

This was a case of positioning the fittings before drilling and tapping into the carbon plate, then fastening bolts in with epoxy resin. The wings were put in place with the existing trampolines modified at the rear end ready for sewing at a local repair shop as I didn't have a sewing machine at that time suitable.


Fittings being mounted and wing trampolines being re cut. Non skid finish now visable

Hull Clean - Underside

The hull graphics on the underside were the last to go in the new look. As mentioned earlier the amount of paint on the hull in clear coat and colour was substantial. First the clear coat had to be removed. The red was then removed, leaving another coat of clear underneath that polished up just fine. It was obvious that the graphics pattern was designed to hide cloth overlaps in the hull lamination but these I could live with if it took off a kilogram of paint.




Bladerider graphics and red colouring removed and then the hull polished

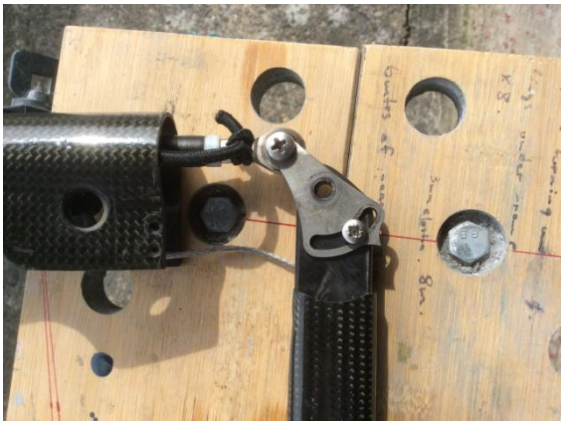
Bowsprit and Hull Pushrod

It was now time to make a start on the bowsprit and adjustable wand length housing. Mike Cooke offered setting plates to suit the the Rocket fin I planned to use, with advice on its setup. The wand housing tube was laminated in carbon over a balsa shaped mandrel with a mylar sleeve on it. A 10mm ID carbon box section was then glued internally for the 8mm wand to slide into without rotation.

Solid plates were bonded and laminated on the the front end of the bowsprit to take the pivot bearings and in the head of the housing tube. Assembly and getting the length adjustment to work smoothly took a little time with an elastic pre tension against a single line lengthening the wand. This was later changed to a direct continuous line adjustment.

The pushrod running aft from the bowsprit inside the hull was made from 8mm diameter carbon tube. This finished in the cockpit floor, located in a teflon guide set forward of the fin case. The link from this pushrod back to the fin connection was a 12mm carbon tube with brass tapped ends to operate as a large turnbuckle, adjustable from the wing.






Bowsprit and wand with carbon hull pushrod. RHA barrel adjuster on the floor with a rose ball joint connector. This drops over the pin in the head of the mainfoil, adjustable vertically for gearing change on horizontal foil flap movement.

Foils

The rudder and mainfoil needed some work before they could be used as the setup was quite different from the designs they had come from. Both horizontal foils were fixed on to the verticals. For the rudder, this was not a problem as the AOA relative to the rake adjustment set at the tiller head, fell within a close range of my existing gantry angle setup.

The rake adjustement mechanism in the tiller needed replacing. I ended up modifying the **BR** system to fit inside the smaller tiller that came with the rudder. Some carbon reinforcement was needed to repair a small crack at the head and at the lower gudgeon point.

The mainfoil was more of an issue in that the horizontal AOA was set for a forward raked fin of 4 degrees at the base. This had the horizontal set at the desired 1.5 degree of lift when measured

against the boats horizontal datum point. As my fin case set the fin rake at 7.5 degrees, this would have given me an AOA of 4.5 degrees lift!

This meant the horizontal needed to be ground and removed from the vertical and re set for the correct lift, then glued, laminated and faired back in place. The internal foil pushrod then needed shortening to operate correctly without buckling. The fastening pin point at the head needed re shaping to act as a buffer for the hull pushrod to come back against. This stopped the foil pushrod from being overloaded.




Rudder reinforcement, mainfoil horizontal set at new AOA angle on vertical foil before being laminated and faired. Mainfoil head with holes filled before pivot pin axis moved higher and all re shaped

Rigging

Wings were fitted with the modified trampolines and all tensioned in place. The original gantry was fastened back onto the transom. The mast was stood up to adjust the stump and mast height and check that shroud lengths were workable. Some basic control lines were led and the rig and sail were put on the new setup for the first time.

I added kicker purchase for the higher loads expected, using the old control lines to check lengths needed, before purchasing new smaller diameter lines easy to splice for a continuous sysytem. The first issue, as expected, was the low height of the mainboom behind the mainsheet that would make tacking a problem. I had planned to cut and bend this boom for more clearance, but with Grafham only a week away, this would need to do for now. Taking a bit of rake out of the rig helped a little.

With only a few days to go, new control lines were fitted. The bowsprit system had control lines led outboard and the foils fitted for final check on AOA and mainfoil flap travel. The boat was put on the trailer ready for a first sail for the year.



Mast up to ckeck shrouds thensail up and control purchases checked. Final pic with all controls and new lines in place ready for first sail

Open Event - Grafham Water SC - April 14th 15th

I managed to get away early to Grafham for a Friday sail before the weekend event. Light winds were predicted for the weekend but a late Friday sail was good to check if things worked. A few small binding problems with the gearing system was stopping the mainfoil flap from getting enough lift for take off. I sorted the issue enough for some marginal foiling and the boat seemed a little faster than previous when I was near a couple of others for comparison.

Saturday came and plenty of sunshine, but no wind. There was an informal tuning and rig setup session held in the rigging park that quickly identified a problem with my cunningham/downhaul setup. An afternoon of adding more purchase and some adjusting of my wand ratio setup took up the rest of the day.

Sunday had light drizzle and a marginal foiling wind. We managed 3 races with the first mostly foiling and the other two very marginal to the extent the planned fourth race was abandoned. Positives for the weekend were that when I was foiling, I was higher, quicker and more level than before. Lowriding mode was still good. Negatives were that the boom was far too low for efficient gybing and the take off points for the mainfoil vertical gearing adjustment were binding the pushrod movement. In all very happy with progress made.

The boat now would not be sailed until June through radio sailing commitments abroad.

A windless day setting up and first race day at Grafham SC.
Sailing pic: James Sainsbury

Event Report - www.yachtsandyachting.com/news/204205/Moths-Low-Riders-Waszps-and-Grafham-midges

All about Recycling

One of the real strengths of the Moth class is that there is so much equipment offered up for sale regularly, from all levels within the fleet as skippers step up to a higher level. This benefits skippers at the various levels in the fleet in allowing them to upgrade at an often attractive cost.

It is a win/win for the class where the top end skippers upgrading to the latest kit can move on their used gear, and others get to step up as their abilities and budgets allow. Older boats benefit from the available upgrades, keeping a healthy fleet from top to bottom.

Both of my older foils, mast, sail, boom, wand mechanism and original trampolines were advertised and sold on near instantly to other Bladerider owners looking for spares to keep them on the water.

Original Bladerider gear all sold off on the Moth Buy & Sell FB page

Upgrade #1 Boom

Having intended to cut and bend my boom for more clearance, I came across a CST bent boom advertised that would be a much stiffer option. This boom had a strut and was set up for an internal downhaul that would further tidy that area up also. I recut the mainsail foot profile to

match the boom which gave enough room, without having to raise the clew. The existing C-Tech straight boom was sold on. This upgrade was a case of right place right time.


New bent boom showing the extra clearance room before the mainsail was trimmed to match.

Long Distance Race - Bala SC June 16th 17th

Itching to get back on the boat after a break, I entered the Bala Open mixed class event with a plan on just spending a couple of days sailing the boat before the upcoming Nationals.
A perfect 10 knots blowing straight down the lake but sadly I got no further than 200 metres from the beach before the rudder gantry broke. I managed to limp back to shore but was pretty annoyed with myself for knowing that the gantry may have been a weak spot that I had wrongly overlooked for too long. Poor preventative maintenance...

A weekend wasted and with just over 2 weeks until the Nationals a real dilemma. Do I try and fix this one? Could I find an old one? I knew KA Sails in Australia had a small supply of old Bladerider stock but wasn't sure if they had gantries. Thankfully they had a stronger aluminium version they suggested would bolt straight in place. Surprisingly it was less than 100grams heavier than the one that broke. In less than a week, I had a new gantry fitted within 10 minutes of unpacking, at a price far cheaper than I could have thought possible. Good to go!

Broken rudder gantry

UK Nationals - Thorpe Bay SC, Southend July 11th 14th

I arrived early hoping for a day or two of practice given I had had so little time on the water. Access to the water was limited by tide influence that has the course area totally dry at low water. I watched a few of the top skippers have a sail on the day I arrived in winds gusting just above 20 knots. I set up my tent on the green, across the road from the club that was set aside for competitors and finished some outstanding boat work jobs.

The following day I managed to get on the water for a practice in a marginal off shore wind. Things seemed to be working ok but the new tube gantry without any fairing was throwing up no end of draggy wash when trying to get on foils. After a good sail I came in and made a sailcloth fairing for the lower section to help remove some drag if I could. Kyle also stopped by to show me some quick ways to splice my continuous control lines and tidy things up a bit.

Racing on the first couple of days was a little hit and miss for me. Patchy wind and a bit of weed on the course made it hard to get any kind of feel in a setup I wasn't used to. When I was foiling I was ok but that wasn't as often as I would have liked, often through poor decision making.

The final two days improved to building sea breezes against the tide with some good waves across the course. I had a couple of decent races just off the back of a few boats I hadn't been near previous, and in the final race managed to come through a few more who were upside down at the leeward mark in the strongest wind of the event.

I enjoyed a bit more wind and having to think about waves downwind that I hadn't done for over 15 years. I felt the boat was ok upwind but not flying as high as it could. Downwind control was safe, but im sure I wasn't pushing it as hard as I should have been as I wasn't close to capsizing at any stage. For so little time in the boat, I was happy it all worked and stayed together.

Another super well run event only marred by a little weed. The top guys as usual were a long way off into the distance. The team at the club couldn't do enough for us and near everyone staying on site was good for the social side.

Tents on the green at Thorpe Bay. Sailing Pic: Mark Jardine Y&Y

Event Report - www.yachtsandyachting.com/news/207682/International-Moth-UK-Nationals-overall
Yachts and Yachting article - www.yachtsandyachting.com/news/207657/An-affordable-route-into-foiling-Moth-sailing

Upgrade #2 - Rudder July 30th
On reading the report on my project I had received some advice from Kevin Ellway that I could get a bit more speed from the boat by reducing the size of the rudder horizontal I was using. Rather than just dock the tips and have draggy square ends, I reduced the area profile and planned to re shape the foil sections to suit. Once cut, I discovered the foil was hollow which allowed me to clean and bond the leading edge sections back together to reduce the tip chord thickness. Once glued, the foil was shaped, faired and painted.







Ninja rudder compared to a newer Rocket one before trimming and reshaping. An obvious area for a further speed upgrade in the future.

Scottish Open - Loch Lomond - September 1st 2nd
Another event and another early start to get to the lake for an afternoon practice. I felt following the Nationals that my mainsail profile was too short on the foot and lacking power when set deep compared to newer sail profiles. Paul let me put his North V7 on my boat to see how it looked on my mast. Notably the foot length matched the boom length as opposed to how short my existing sail was in pictures above. Something to also consider moving forward.

After messing about for a bit, the wind came in to a gusty 10-15 knots and I had a sail. I had a problem in stronger gusts later in the day going upwind, where my wand didn't have a strong enough elastic return on it to keep it forward. As the wind blew the wand back for more lift on the mainfoil, it just ended in a crash. A stronger elastic over a longer length was fitted that evening after checking a couple of the other boat setups in the park.

Saturdays racing was light marginal foiling conditions. Boat was going fine with the smaller rudder not showing any problems. A couple of results in the middle of the pack of 12 boats was pleasing.

Sunday had a patchy wind gusting into the 20s not long after launching with a few marginal moments downwind. It was the first real test at speed of the newer foil upgrades for the year

and thankfully gone were the moments of the old rudder letting go at 19 knots. I had a 10 second average speed of 24.8 knots in the windiest race without a crash so it was definitely an improvement over the previous year, but still well short of current boats in similar conditions in a straight line.

A couple more mid fleet finishes and I was pretty happy with that, as I started to feel a bit more comfortable in the boat. The only setback of the weekend was a miss timed start having me clip the back of the start boat and throw me at the mast. A 'brain fade' moment where I came in late and had a boat beneath me that I had to keep clear of. A lesson learned that could have been much worse.
In all, it was a good weekend with great hospitality once again.

A more current V7 sail on the boat to think over for the future

Event report - www.yachtsandyachting.com/news/209593/International-Moth-Scottish-Championship

The Season Wrap Up
Sadly 2018 was a season with less time on the water than I would have hoped, due to a busy radio sailing season that had a number of date clashes.

My objective for the year was to make the boat a stiffer reliable platform and improve its speed within my budget. I feel I managed to do this, with the boat further ahead of my capabilities than it was in my first year. The base platform now had a setup that can be more easily improved on through better foils and rig.

The upgrades and modifications to the boat added close to 4 kilograms of weight which kept it all within the ball park of current leading designs. Less than half of this amount was in adding hull modifications including bowsprit, pushrod, sleeving and added stiffness. The rudder, boom and mainsail upgrades took the largest portion of other gains.

From a cost point, I am convinced that I am well ahead, given the standard that my project is now at. To me the boat is better now than an early Mach2 or similar for much less cost than had I have sold my **BR** and went that way. It has more current upgrades and is now ready to easily accept more.

Of course my overall costing does not include my time and labour, but if I am happy to do the work, then that is a gain that makes this level of sailing for me accessible.

Finally, as with the previous year, the biggest improvement I could make is getting fitter, lighter and going sailing much more often.

The World Championship for 2019 was set for Mounts Bay SC in Perth, Western Australia and I planned to be there. As a kid I spent a number of holidays sailing in WA with family on my fathers side based there where he grew up and had many friends there I wanted to catch up with. It was a must do for me...

Moth component weights 2017 to current					
	Bladerider X8 GBR 3169		Modified X8 **2018 Nationals** GBR 3169		
Hull (complete less rig and foils)	**19.75**		**21.544**	to do	1.794
Main Foil (complete)	**2.985**		**2.785**	Rocket	-0.2
Rudder Foil (complete)	**2.825**	(box 1.065)	**3.338**	Ninja	0.513
Mast (less spreaders & shrouds)	**2.715**	own	**2.295**	c-tech	-0.42
Boom (including blocks)	**1.356**		**2.62**	cst bent	1.264
Sail	**3.93**		**4.85**	North H13	0.92
Spreaders & Shrouds	**0.82**		**0.82**		0
Velocitek			**0.2**		0.2
Total Sailing Weight Kgs	**34.381**		**38.452**		
				Weight increase	**4.071**

Upgrades for 2019

My list of upgrades for the next season was not huge, but I needed to tidy up some areas of existing gear and think further on a more current mainsail design and a rudder foil upgrade. I would also need to organise enough spares to be self sufficient if I hoped to do the worlds in Aus in the expected windy conditions.

Coming Up...Part 3

Project Moth - The Next Step 2019
I run through a list of latest upgrades made, with explanations on how and why, as well as events and what was learned along the way...

Cheers
Brad Gibson