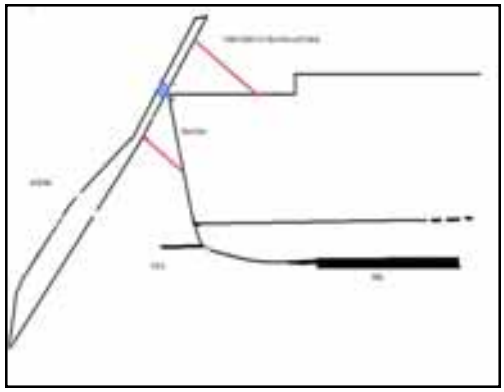
Catalyst

Journal of the Amateur Yacht Research Society

NUMBER 44 OCTOBER 2011



Cover Picture:

Team Korea leads Oracle Spithill to win a place in the semi-finals of the AC45 racing at Plymouth, UK.

Photo: EJC Chapman

Catalyst

Journal of the
Amateur Yacht Research Society

Editorial Team —
Simon Fishwick
Sheila Fishwick

Specialist Correspondents
Aerodynamics—Tom Speer
Electronics—Simon Fishwick
Human & Solar Power—Theo Schmidt
Hydrofoils—Joddy Chapman
Iceboats & Landyachts—Bob Dill
Kites—Dave Culp
Multihulls—Dick Newick
Speed Trials—Bob Downhill
Steam Power—Lord Strathcona
Structures—Keith Burgess
Windmills & Turbines—Jim Wilkinson

Catalyst is a quarterly journal of yacht research, design, and technology published by the Amateur Yacht Research Society, BCM AYRS, London WC1N 3XX, UK. Opinions expressed are the author's, and not those of AYRS. AYRS also publishes related booklets.

Contributions are welcome from all. Email them to **Catalyst@ayrs.org**, or send (at your risk) disks or typed copy with illustrations to the Society's office. AYRS can take no responsibility for loss or damage in the mail.

AYRS subscribers receive both *Catalyst* and the booklets. Subscription is UK£20/US$30/Eur15 per annum for paper copies, (£10/$15/•15 concession for the retired), £10/$15/•15 for download copies. Subscription requests and all other queries to be sent to the AYRS Office, BCM AYRS, London WC1N 3XX UK, email: **office@ayrs.org**

AYRS is a UK Registered Educational Charity (No 234081) for the furthering of yacht science.

Website: http://www.ayrs.org

© 2011 Amateur Yacht Research Society
BCM AYRS, London WC1N 3XX, UK
All Rights Reserved

ISSN 1469-6754

Does anyone want any money?

For the second year running, the Committee of the AYRS have had to extend the deadline for the John Hogg £1000 Prize, not because there were no entries of sufficient merit to make an award, but simply because there were no entries at all.

We also have a £38,000 fund, the Howard Fund, available to make grants to members projects. Only one project has received a grant, and there are no applications in the pipeline.

Is there nobody else out there doing useful work, for whom a little funding would come in handy? Maybe to get a mast built, or to buy in expensive materials?

Now we're not going to give the money away to the first person who asks for it simply because it's burning a hole in our pockets as it were. Applications for the Prize, and proposals for grants need to be of sufficient meritto justify the awards. After all, it not our (meaning the Committee's) money, it's your money, and you wouldn't want us to throw it away, would you?

But unless someone applies for it, the money is just going to sit there, because it's in a reserved fund, and we cannot legally spend it on anything other than the purpose for which it was given to us.

Surely there must be somebody out there who could use a little funding?

Semd your application(s) to the AYRS Secretary, BCM AYRS, London WC1N 3XX, UK. Guidance on applying is on the AYRS website, www.ayrs.org.

The "P28 Gonet & Cie" is revealed

The first foiling monohull with a structural sail?

Geneva, 17 November 2011 – The epitome of avant-gardism through the design of her structural rig, in association with her inverted p-shaped hydrofoils, today the "P28 Gonet & Cie" monohull reveals her lines as well as the essence which colours the project. A whole new take on yacht design, she daringly combines two major evolutions in the marine domain, namely: stage foils and a single support rig accompanied by a thick profile sail. A genuine technological jewel, the developed platform provides enough stability to sail in a wide variety of wind configurations. This ambitious project has very recently taken shape with the launch and the first on-the-water trials to validate a complete set of principles. Involved in the project from the outset, the joint owner and member of the sailing team, Didier Quinodoz, explains the process: "The gestation period for this promising foiler has lasted three long years in a bid to determine the formula which enables the craft to sail as well as fly in the widest possible range of weather conditions." The specifications allow for greater stability and performance, as well as making her accessible to a variety of sailors, keen for a thrilling ride in all kinds of sailing programmes.

A history of men above all, the genesis of the project began with two skilled racers and cutting-edge designers who, between them, had come to various conclusions relating to aero and hydro-dynamics. Speculating on the major constraints of the foiler, these boffins worked on introducing innovative solutions to facilitate boat handling and increase the potential for sailing time and hence enjoyment. Hugues de Turckheim, an engineer who has played a large part in the creation of some renowned foiling boats, gives his analysis as project designer and coordinator: "Through her audacity and pragmatism the P28 Gonet & Cie is writing an important page in the era of foilers".

Indeed, the adventure has only just begun for this team of enthusiasts, which consists of engineer-designers, Hugues De Turckheim and Mathias Bavaud, who are responding to the desires of the racers and skiff fans: Didier Quinodoz, Philippe Schiller, Arnaud L'Huillier, Emmanuel Schaub and Nicholas Verwilghen. All of the latter are co-owners and members of the core crew. Partners at every level in this valued technological development, they have been fully involved throughout so as to bring their respective experiences to bear in the driving of a project which incorporates a wide range of skills. Co-owner of the boat on a personal level as well as a Partner at the Gonet & Cie bank, title sponsor to the project, Nicolas Gonet explains this involvement: "We're proud to associate our name with a very fine human adventure, whose drivers are friendship and sporting passion, as well as contributing to the technological evolutions which characterise the dynamics and entrepreneurial flair of sailing on Lake Geneva."

The "P28 Gonet & Cie" is now beginning a programme of adjustments and intensive preparation, which will take her to the start of next season's Genève-Rolle-Genève and the prestigious Bol d'Or.

Laurence Clerc
Comme l'eau communication Sàrl
laurence@commeleau.com

The "P28 Gonet & Cie" can be tracked at: www.p28foiler.com Photos available here : http://www.commeleau.com/Temp/p28_cp01

The AC45 World Series comes to Plymouth – A Personal View

Joddy Chapman

I thought it was an April fool's day joke – the AC coming to Plymouth? Surely not. But on 2nd April it was clear that it wasn't an April Fool, but serious. I hastily booked some leave to stand a chance of seeing it. It also became clear that this was to be raced in one-design AC45 catamarans, fitted with single-slot wings and carrying headsails. Halfway between the full size AC72s for the 34th Cup and the C-Class cats of the Little America's Cup.

Radio Devon's David Fitzgerald introduces the skippers and the auld mug itself (and yes, it really was it, or so I was told). David got to keep the T-shirt, not the mug.

The opening event in Cascais, Portugal set the pattern – a series of fleet racing, "AC500 Speed Trials" and one-on-one match racing, spanning two weekends and the Wednesday, Thursday and Friday in between. At both Cascais and Plymouth, 8 teams competed, with Larry Ellison's Oracle entering two boats. The courses are short, both in distance and duration, for the benefit of viewers and spectators with short attention spans. Close to shore, and with large enough and fast enough boats, it certainly achieves its aim of creating a spectacle.

The Operations Organiser at BBC Plymouth (where I work as a broadcast engineer) promised to get me out on one of the boats – he used to work with Gary Lovejoy, director the AC Media concern, for the old ITV regional broadcaster TSW (and possibly Westward TV before that). When it became clear at Cascais that the AC45 cats carried a "guest racer", the possibility seemed real, but, of course, the chances were very small and didn't, in the end, materialise, although at least 3 of our journalists went out.

The logistics are incredible. The ship carrying everything needed to mount the show arrived in Plymouth a few weeks before racing was due to start. This container ship has been leased for 2 years to transport the circus to as many venues around the world as possible, for two "World Series" championships leading up to the Louis Vuitton Cup in San Francisco and the 34th Cup itself in 2013. Each team has a number of 40' containers to pack their equipment, whilst the race and support boats are carried either down in the hold or as deck cargo.

Team China head out of Millbay for their fateful practice. They cart-wheeled shortly afterwards but rebuilt their wing in time for the racing.

The team's containers provide the side walls of their large tents or sheds. It was clear that the better funded teams (Oracle, Emirates and Artemis) have bigger and better tents than the smaller teams (Korea, GreenCom, Aleph and Energy). China Team was somewhere in between. These team bases, together with the media facilities, management and hospitality were set up in Millbay Docks, which many will remember for being the base of the OSTAR races in the 60s and 70s. My humble media pass only allowed me into the media centre, but this enabled me to attend some of the press conferences.

At the first of these – staged managed for the benefit of the online TV audience, each skipper was introduced in turn by the TV compares (one of which looked familiar – David Fitzgerald of BBC Radio Devon. How he got involved I've no idea). It all felt rather awkward, the skippers looked uncomfortable and the compares didn't really know what they were talking about. The assembled media asked a few questions. Because there had been rumours that the racers were unhappy with the short course format, someone asked if they would have a distance race, for example round the Eddistone light and back, and veteran reporter Bob Fisher asked just how long the courses would be. "About 20 minutes". "Yes, but how long will they be?" (He meant what distance). "About 20 minutes, 40 for the long fleet races". "So how long is that?" "20 or 40 minutes". Bob muttered under his breath "you haven't answered my question".

Between questions the compare David Fitzgerald said that the introductory TV sequence showed that the boats could reach speeds of 45 knots. The skippers shifted uncomfortably in their seats, some started at the ceiling and others looked at their shoes. Loick Peyron, who by this time seemed to have become the skipper's spokesman, said, no, that's kilometres. No one seemed to know how to translate this into knots. I asked what they thought of the 500m time trial – was it fun or a distraction

from the racing? They all looked uncomfortable again, and Loick said "it is part of the show, it will be developed, maybe it could be improved by sending two boats down the course together".

All too often the weather in Plymouth can be contrary and not play ball. This time it delivered, thanks to the remnants of hurricane Katia with winds at the mid to upper range of the boat's limits, although much cooler than Cascais. The first weekend's "Preliminaries" consisted of fleet racing. Typically a 40 minute race followed by a couple of 20 minute races. Clearly the start is the most exciting moment, so the more starts the more excitement.

Plymouth was the first time most of the competitors had to experience upper-limit wind speeds, and for the many it resulted in capsizes, either in practice or during racing. This gave the shore support teams the chance to show what they can do, and it's impressive. China Team's wing was comprehensively wreaked but re-built overnight, and GreenCom had to fit a replacement starboard hull after finding delamination over a large area of the carbon/nomex structure.

At a second press conference, all the British crew competing were lined up for media examination. They looked more relaxed than before, perhaps

Smiles all round..."The British are coming?" Err, well no, actually...

After the round-the-buoys stuff a race track right in front of Plymouth Hoe was cleared for the AC500 time trial. Set roughly at 90 degrees to the wind, readers of Catalyst will know that this will not deliver the highest speeds, but in a strong wind it is in what the racers call the "death zone", which makes it particularly difficult to keep the stern down and the bows, which are wave-piercing and really want to be submarines, from achieving their ambition. Billed as being a brand new innovation for yacht racing, it harked back to the early years on Portland Harbour, with only one boat being allowed on the course at a time. They have much to learn, but it's a start. It was actually a bit tedious to watch, for although "on the edge" they don't actually go that fast – it's not like watching a kite board go past at 40 knots plus. Around 26 knots is typical. Later, back in Millbay, I overheard a crewman tell his shore crew that the racing was good but the speed trial a bore.

because they had got past the opening weekend. Here is a summary of what they said:

Iain Percy, tactician, Artemis Racing: Tactical differences from "normal" racing? – Course boundaries make it different and still learning.

Peter Greenhalgh, tactician/trimmer, Energy Team – Not capsized yet...a matter of time! Learning French...

Will Howden, floater, China Team – all night rebuilding wing.

Simon Hiscocks, Wind Trimmer, Pete Cumming, trimmer and Ed Wright, bowman, GreenCom Racing – whilst polishing the hull found that it had delaminated. A very demanding boat to handle.

Chris Draper, skipper, Mark Bulkele, trimmer, Matt Cornwell, bowman and Chris Brittle, floater, Team Korea. Boats are up to the job. Problems with non self-taking jib. Shorter clew jib more tolerant, perhaps need to look again at how the short jib sheet is managed when mark-rounding. (A "floater"

is a general hand with no specific role).

All – any chance of a British AC challenger? Haven't heard anything.

The next day brought the chance to hear from Stan Honey, Director of Technology and Mike Martin, Director of Umpires and Rules Administration. Stan described the genesis of the LiveLine system that superimposes real-time data onto live TV images from a helicopter.

Stan is an electronics engineer and sailor, so becoming involved in the AC was the ideal job. He had originally developed LiveLine for American football, then baseball and motor sports. For these, conventional surveying techniques could be used to locate the fixed camera positions, which enables the computer system to work out where the graphics overlays should go. But for the AC, use of helicopter mounted cameras made it a whole lot harder. The solution has been to use military guidance systems which can achieve positional accuracy to 2cm and angular accuracy to 1/100th of a degree. The hardware is squeezed into small black plastic suitcases (Pelican or "Pelly" cases), containing GPS and its military augmentation, and an inertial system of accelerometers. These cases, together with the grey battery cases they showed on the weekly "America's cup uncovered" TV programme, are on all the race boats, marker boats and helicopters, with data from each being sent back to the LiveLine system which generates the graphics for TV and also for the umpire's display. The data is also used by VirtualEye, which can be used if low cloud prevents the helicopters from flying. Unlike VirtualEye, LiveLine is limited to the (one) helicopter wide-angle view of the racing. The technology comes under US Export Control and requires permits to be allowed out of the US – it's that special.

Stan and a HoneyBox.

As an aid to managing the race it works like this. The race officer sits at a console and can drag the course markers and course boundary around on a touch-screen until the predicted course duration meets the requirements for TV coverage (20 or 40 minutes). When happy, he hits the "commit" button and all the course data is transmitted to all the mark boats, which then drive to their allocated locations. The crews on the mark boats radio back to the race officer their observations on whether there is sufficient room for the race boats to safely round the mark or not, and after several iterations the course will be set. Course data is also sent to the race boats, which have a Stowe text display unit and flashing red LEDs to show distance to the course boundary, and flash yellow if they have been given a penalty. The competing skippers can press a button on the Stowe to protest, which is relayed back to the race officer.

During a race, the race officer monitors the duration of the race and based on the predicted AC45 performance can (and does) move the course markers to meet the race duration target. The LiveLine system tells the umpires if any boat is OCS or strays outside the boundary. The penalty notice is then (manually) sent to the competing boat, whose LEDs flash yellow. The umpire sees a line on his display which moves at 75% of the offender's target Vmg. The offender has to slow down until the line catches up with him, when he is "released" from the penalty and his LED stops flashing yellow. Clearly, the quicker the offending boat can slow down the sooner the penalty will be served, and the crews seem to be learning this such that some can still go on to win a race even if they serve a penalty. This is as it should be.

There was criticism from Cascais that sometimes crews were not aware that they had strayed outside the course boundary, but Stan said this may have happened if the course had not been uploaded correctly, This should have been fixed for Plymouth, by having the boats' system send back an acknowledgement on successful upload. It was also suggested that spectators (rather than viewers) couldn't see who had been given a penalty or who had protested who. The AC organisation were

aware of this but it is early days – possibly flashing lights on wings.

All the data from the liveLine system is made publicly available at the end of the day. Live streaming of data will become available once the necessary mirror servers have been set up. This will also be free, with the hope that 3rd party software developers will build applications around it. For example, an iPhone app that brings up live boat data when the phone is pointed at a boat as it goes by, or for internet virtual gaming. If applications are good enough, they might be adopted as "official" and be allowed to use the classic AC Cup logo. At the moment, only basic performance data is available, but for the larger AC72s, things like rudder angle and winch loads will be published. (And have no doubt that this will be loaded into an Oracle database so that Oracle can model their competitors' boats and "race" their AC72 against them, without actually taking part).

After the technical briefing, I met Peter Rush, one of the commentators. I put it to him that much of the commentary was rather simplistic, and he agreed and that was why they now had two audio feeds to give viewers a choice, and were working to improve the specialist sailing commentary. The addition of Mitch Booth to the commentary team had helped, but there was room for improvement. He also said the biggest problem was the sailors swearing. Whilst they might get away with this online, it was not acceptable for broadcast TV. The TV coverage is undoubtedly impressive, with a remote camera operator for each boat offering shots from four onboard cameras to the director. The commentators only see the main output and the LiveLine or VirtualEye overview, which is why they sometimes miss something.

The bottom of Team Korea's wing. The white square is the counterweight tank of water used to balance the wing when hoisted by one of two cranes that come with the circus

On the Friday I had the chance to go out on a mark boat, to see how this worked from the sharp (windward) end. I was allocated to *Mischief,* an Australian built LeasureCat sports boat fitted with two large outboards, and crewed by Pete and Rory. There were no fishing rods and certainly the job required full concentration for the 6 hours we were out on the water. The mark boats don't anchor – it would be impractical – so they keep position manually. From instructions transmitted to the LiveLine display (a modified Garmin chart plotter), we motored out to our designated position. This was the left hand windward mark near Drakes Island, for the Friday afternoon match races. Initially we were just to the north of the island, too close to

the Royal Western's yellow moorings and the port hand channel markers. A couple of AC45s practiced their windward manoeuvers and it was clear that we needed to move. In the end we were positioned just to the east of the RWYC moorings, but were constantly being moved further south to keep the windward mark to windward, in a very shifty, gusty westerly breeze that was steadily backing to the south-west.

race officer and using his skills and experience as a sailor rather than being totally reliant on the technology. As race boats round the marker boats, total concentration is required of the boat driver to keep station within a few feet of the given location, and in Plymouth, with complex tides and gusty winds, this was a challenge, but met with great skill. Most impressive.

Team Korea leads Oracle Spithill to win a place in Saturday's semi-finals. The mostly British crew skippered by Chris Draper finished second overall in the match racing.

A near constant radio conversation is kept up between the committee boat *Regardless* and the marker boats *Mischief*, *Defender*, *Volunteer*, *Constellation* and *Atlanta*. One of the markers had suffered a broken gear-shift cable to one of its outboards, so *Defender* had to double up and dart between being a starter mark and the other windward mark, opposite us. Once we were on our mark, Rory would use a range-finder and hand-bearing compass to direct *Defender* to be the correct distance and orientation from us, relative to the local wind speed and direction, thus acting as the local eyes for the

On this occasion, with a westerly wind, the race course was basically windward-leeward up and down in front of the Hoe between Drakes Island and a line between the Royal Plymouth Corinthian Yacht Club and the Mountbatten breakwater. A very short course, which required three laps to be 20 minutes long. With up to 9 match races there would be 54 windward mark roundings to observe at close quarters, although sometimes they chose to go round *Defender* rather than us. Needless to say I ran out of camera memory in no time, but this meant I could try to observe what was happening in more detail.

The LeasureCat has an open stern deck (although there is a little gate at the very aft end so you don't fall out), which meant that I got my feet wet from the significant wash generated by the AC45s as they turn. I could see why Rory was wearing boots! The other noticeable thing, perhaps not so apparent from the TV footage, is the acceleration as the boats' gennakers are unfurled. From the mark boat you can feel the blast of wind deflected off the gennaker as it cracks open, and get a face full of spray as the leeward hull seeks out its devious submarine intentions.

Oracle Spithill executes a flawless windward mark turn, bearing away to fill the gennaker as quickly as possible.

Being a fairly breezy day, with gusts to 18 knots, the wing was quite well twisted with the top section flap pretty much in line with the main wing. Lower down the camber was retained. The crews would hoist the furled gennaker on the last windward tack, then tension it using the jib-sheet winch (I guess). On rounding the mark they released the cleated-off jib sheet onto a second (fixed) length sheet, and unrolled the gennaker. The younger, braver, skippers (such as James Spithill, who was the most aggressive) would bear away to fill the gennaker *before* it was sheeted in, gaining a huge downwind advantage. This was fine in medium winds but in a stronger gust, as he rounded *Defender*, he got it wrong and almost capsized, giving Team Korea an unstoppable lead and a place in the match race semi-finals. More cautious skippers would not bear way quite so much and would sheet in the gennaker first to build speed and only then head down the course.

For me, the day on *Mischief* was the highlight, and thanks to Pete and Rory and the AC organisation for making this possible. Also, for me, match racing is what the AC is all about. I don't understand why the organisers won't carry forward the match race results for the AC45 World Series, instead of only taking the result of the final Sunday fleet race.

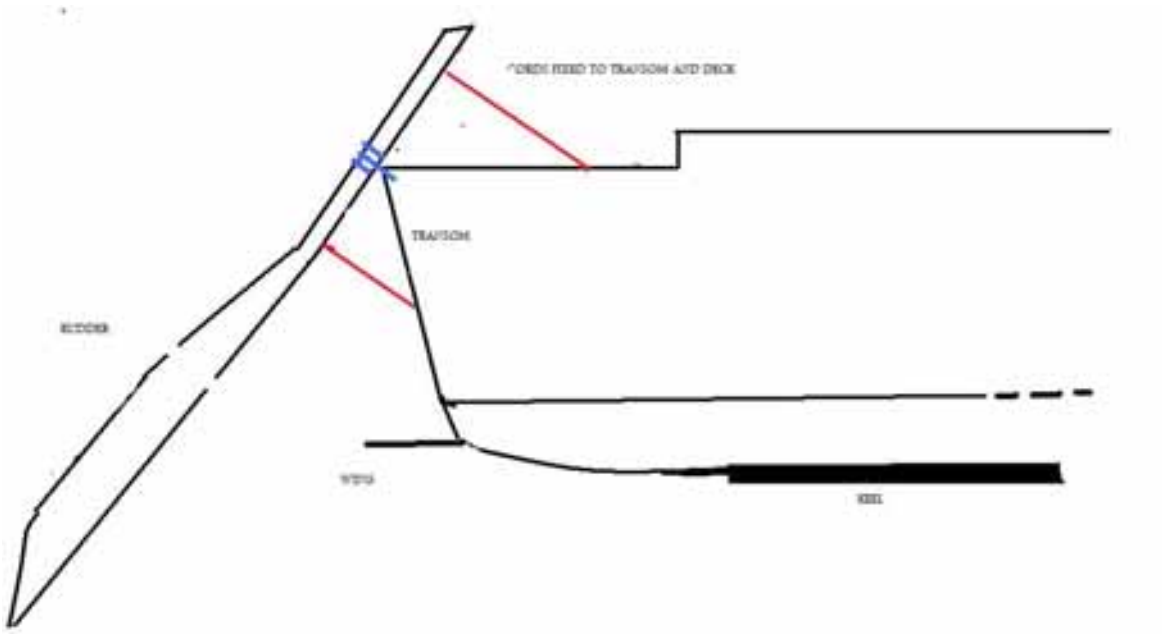
Windward gate mark boats Mischief *and* Defender*, as Oracle Coutts approaches, 24 seconds behind ETNZ, with the author watching from* Mischief.

Improvement in Wave Propulsion Devices:

Using the power of the sea waves to create forward motion in a boat.

Gustavo Tabakian

I have never calculated how much a wave weighs; I suppose this can be measured in tons. And all that water in motion almost all the time: tides, currents, waves; also the wind generates motion of water and interacts with it affecting floating objects. Normally, we accept that if something is possible, somebody else did it long time ago: oars and sails was used for centuries by our ancestors before



engines came on the scene. But after new materials were invented, all of that was improved, as seen in the world of sailing and rowing.

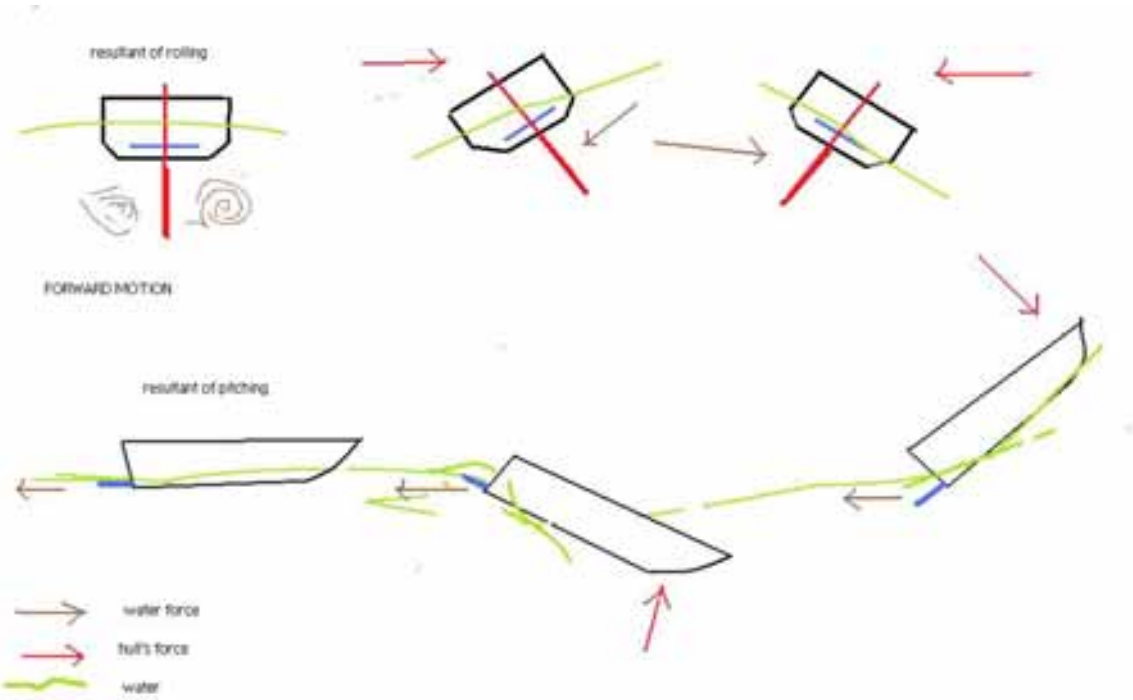
Today the wind can be tracked at a smaller angle and several persons have crossed the Atlantic rowing. Now, I was an enthusiast of sculling oars, because this is a very simple and relaxing way to propel a boat, fitting to a minimalist mind like mine; but at the same time I am still researching about the possibility to propel a boat using the waves. I love the lines of powerboats but I don't like to depend on petrol and at current prices I think most of people are looking at their budget.

Now, after researching in the net, magazines and some books about the boat propulsion, I have seen several models that are not capable of working with beam seas, others that produce more drag than desirable, and most of them a multi-complication of springs, monstrosity of floats, fitted in expensive boats and developed by engineers. So I like to go back, to trial and error and to the old

technologies, I suppose that somewhere, somebody used to sail across the waves with timber, cord, and after observation of nature and some experience rowing. So, looking at the different kind of oars, from the paddle to the ro, I saw that the last one, like the yuloh and western sculling, uses hydrodynamic lift. Most of us know the modern propellers uses a similar motion to sculling, so the matter is to do sculling faster.

In pursuit of that idea, I made a sculling oar, changing the horizontal blade to a vertical one. This decision was looking for a blade -or propulser- with less drag, capable of using the rolling of the boat. I liked to begin with something at least a bit proven, so I began with the fishtail oar made by Douglas Martin as seen in the Small Boat Journal, N°46 in an article by Ben Fuller, curator at Mystic Museum. I made it in plywood and pvc pieces, changing the profile but maintaining length and proportions. What I did then was to fix it to the transom of the boat, at 30° approximately, with an universal joint, and from the flexible tube of the loom fitted one lanyard (elastic as well) attached to the center of the boat and parallel to the keel. It didn't work, if the current was from one side, the blade went to the other and stayed there. Conclusion: too much flexion. I needed something more rigid, and supposing my idea to be too stupid I left it for a long time. A big disillusion, and throw away the "device" (bad idea, the paddle was a very good shape and improve the initial model).

Then, as ever with the idea to save some petrol, I decided to do a yuloh. I received a lot of help from Douglas Brooks who sent me his article "A Different Way to Ro", and was very enthusiastic about my project. After reading *Catalyst* N°34 I contact Slieve MacGalliard, and his study of yulohs was a great help in looking for proportions. Mike Bedwell contacted me, after seeing in my blog the plans for a yuloh that Bob Hollis sent to me from Australia, and his opinion that the use of his device in rough water is possible was a big help as well.



The first benefit of my work – if I can call this work – is to show that fellow sailors are reliable, at least most of them. Chuck Lumweiber from Duckworks was also very kindly, as was Simon Fishwick, editor of this magazine. So, at the end of all this research, and after some study of internet forums and writings, my ro results in a very efficient way to propel a boat, faster than 3 knots for a long time, and capable in rough waters, mostly after improving the universal joint at the fulcrum.

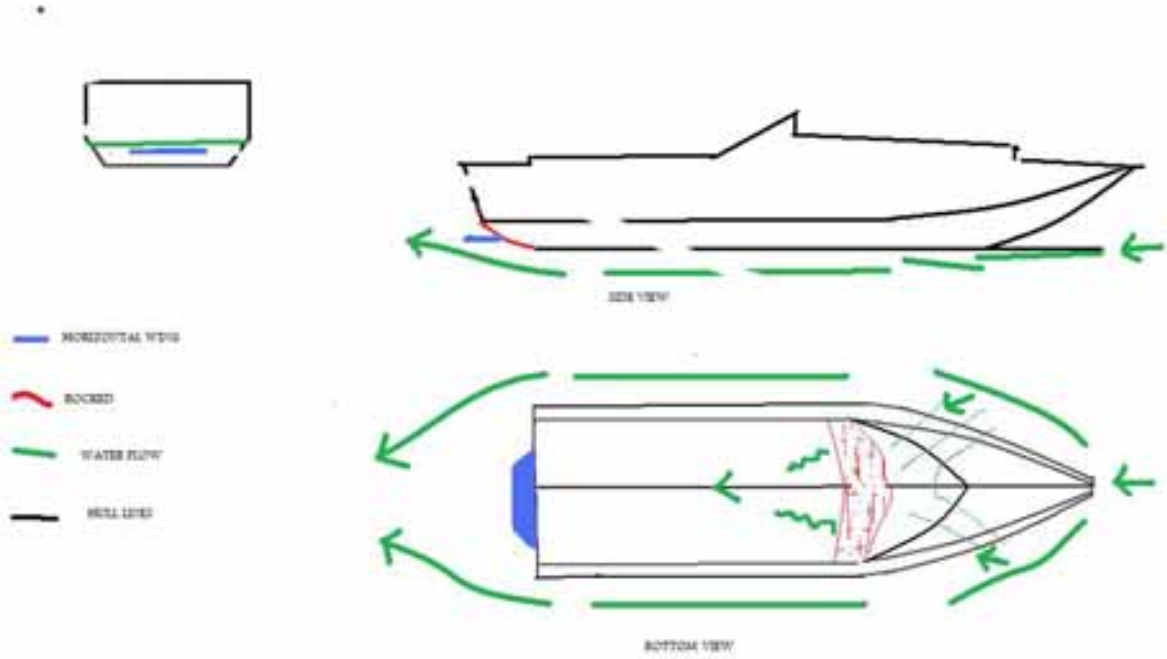
But I was not taking in account, at least consciously, was this: the selftending characteristics of my ro-yuloh hybrid (like most sculling oars of

this kind) was capable to propel the boat in the waves with less effort than in the calm. So I went back to the old idea.

I took an old wooden oar, like 4 feet of paddle, and after cutting out the rot I carved it with my precious knife to a vertical profile. This results in something like a rudder, or fin, or hydrofoil, call it whatever you like, narrowed from 4" at the waterline to 6" at the tip of the blade (where is the balance point); this with a loom something like 5' long. From the balance point to the stern – where I made a universal joint – I left a bit more than 2' (or where this thing balanced leaving it at 30° from the stem to the water, with 3/4 of loom immersed). And from the upper side of the extremity of the loom I attached it to the deck with a lanyard, at an angle bigger than any yuloh. With this thing on the back of my boat I was capable sculling in the calm, not efficiently as the ro I mentioned before, but capable of 3 knots with a little, but noticeable, effort. In the chop this was working differently: I needed just to steer with that lanyard or by holding the loom.

With beam seas this works as well as with head or stern seas (talking about speed and efficiency), and the skipper need to learn again how to sail. He needs to manage the waves, the wind and tides, developing some intuition or sensitivity. The speed was not too reliable yet, at least to propel my 20' and 1000 pounds cuddy cabin craft. An important matter to note is that the fin doesn't moves through a big angle, probably only 5 degrees to each side, and that after the top speed is reached, it is capable of maintaining it, and it gives regular drive, not varying from wave to wave or when steering (that is when using the lanyard, not when handling the loom).

So, I was thinking in how to increase the speed, studying to do a bigger fin using plywood and pvc inserted in a rigid wooden stick. But this is not the solution; because the bigger is the fin the slower is the motion, just the horsepower is supposed to increase. Then I remember a short interview somebody did with Ken Upton. I read it a couple years ago when I began to study about the possibility of wave propulsion, but my memory didn't help me much, but Ken was telling the journalist that if an small fin is positioned a bit before the main one, this will increase the power and efficiency of a water power generator he developed. I can't mention the books I was reading about, but I remember a Japanese engineer telling that some modifications in the hull can produce redirection of the water motion to the rear, without movable fins.



The solution I found was to add something like a step in the stern, under the flotation line and raising the bottom level, horizontal or parallel to the keel. The size is 3' long – where fitted – and 6" wide. With this – I think doesn't work like stabilizer or flap– the boat can move by itself if somebody is skipping or rocking on the deck. The result was a good improvement in speed, and improvement of displacement of my planing hull without any significant wake (anyway my multichine boat was producing just a bit of it). So I think the last addition can help to make a multipurpose hull, capable of efficient displacement, semidisplacement and planing.

The surprise comes after some time using the total wave propulsion system:- in some conditions the rudder – oar, fin or whatever – is cavitating slightly and the boat tries to go faster. Another important thing important to note is that the rolling and pitching sensibly diminish, obviously converting into forwards propulsion.

Finalising my brief description of the system, I will say that when I build the hull I made some modifications to it, thinking about the matter that the Japanese engineer I mentioned above says about the wave propulsion. In the first third of the bottom, just in the middle of the curve from amidships to the bow, I converted the flat to a certain concavity of one inch deep from side to keel. And being all flat to the transom, the last two feet or so I made a bit rockered, something like five to ten degrees. I was a bit diffident doing it, because a hull is forever, but I suppose it is better it be more pronounced.

Finally: apart from the necessary rudder, the whole has no movable parts. I don't know any more than it is important to take into consideration the water flow, vortices, wind, tidal and currents, waves and friction, pendular motion, or more variables working together to make this hull efficient. It could be better, but in that case a deeper study and associated proofs are needed. I hope to do it, but at moment the hull's bottom is still a bit dirty, and I am working with scrap and dollar shop materials. While I don't know the future, I can share all this at this moment, with the intention to be at least interesting.

My intention was ever to make a system with minimum drag, simpler than any engine or sail rig, efficient in most conditions, cheap and reliable, light, easy to clean and repair, without floats, elastics, springs, etc: different from everything I have seen before.

Now I am still living onboard, in the bay outside the harbour, and intending to leave this place (36º44'45" N, 6º25'35" W). But we will see what happens, if in October or later I can cross Gibraltar or Vizcaya Bay; if not, I don't know. If somebody is interested to apply this concept to his boat – planing or displacement with several differences – feel free to contact me to my e-mail or blog (this will be realised soon, I think promptly after this article appears); the same if somebody is interested to apply it scientifically and/or commercially.

Gustavo Tabakian
pacificperlas@yahoo.com
http://wavepropulsion.blogspot.com

Note: Thanks to Douglas Brooks http://thesabaniproject.blogspot.com/ to help by sending me his article about japanese ro oar.

In the images can be seen how the system works. All the rolling and pitching motion is redirected to be a horizontal and forward thrust. In a calm, the rudder acts like an oar, or to accelerate the boat under various conditions.

Under ideal conditions, five to six knots can be achieved, and this is about the speed hull limit. I did several miles using it, trying and experimenting, changing shapes and correcting errors. If good research is done, I think better results can be achieved to make this a primary propulsion system for any boat.

Another thing is that all of the drawbacks for a planing hull when trolling, result this way in a benefit. We need the motion of water, eddies, turbulence, etc. and convert it into propulsion.

Anybody can feel free to contact me and exchange opinions about the use of this in any kind of hull.

The new "Kelsall Cat Rig"

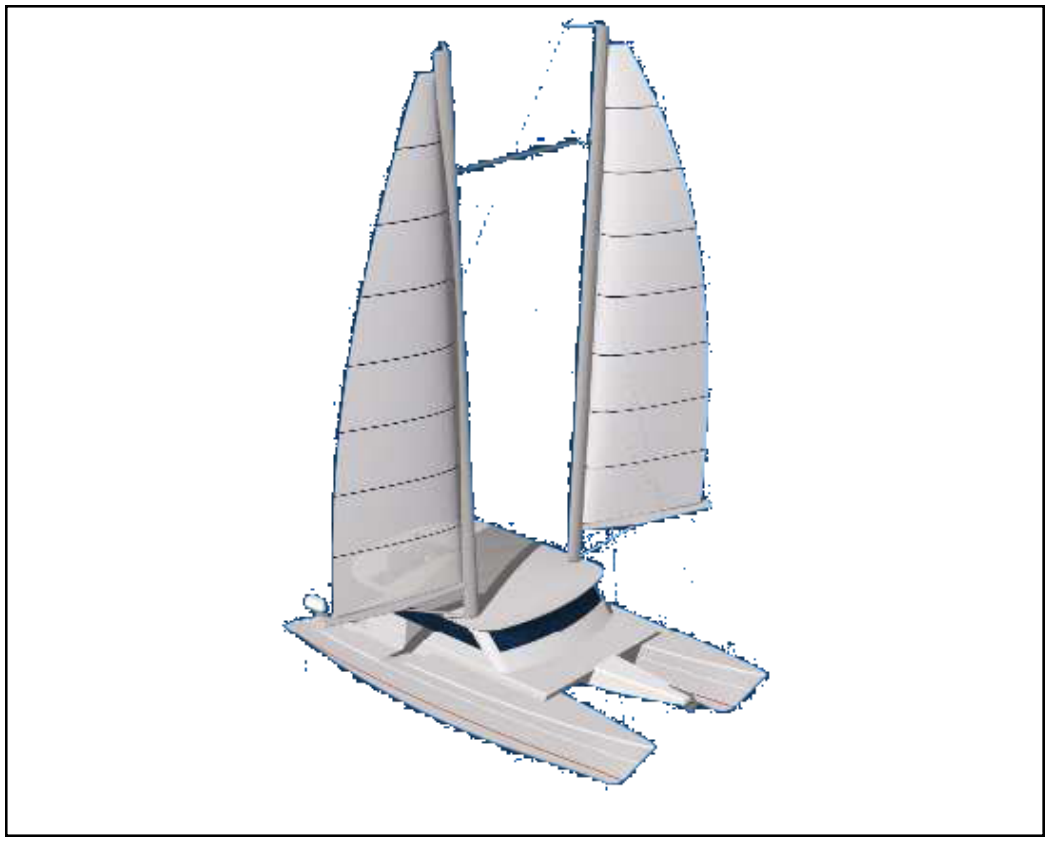
The twin wing rig with a difference.

Derek Kelsall
Kelsall Catamarans

A rig for catamarans, which just makes sense.

Safer, excellent all round performance, lowest loading on all parts of the rig and structure, easy to handle, takes the hard work out of down wind steering, reef down wind, dump at least half the sail area on any tack and you can either build it or buy it. No need for lots of carbon either.

Goal posts and cross bar - The rugby world cup in NZ might be claimed as the inspiration, but not so. This is one of those rare occasions when we have worked on several different aspects of the same design challenge and suddenly everything falls nicely into place. It is the combination of stays, runners, the cross bar and twin wings which works so well.



KSS Kittiwake 42 – will be equipped with Kelsall Cat Rig.

When it comes to supporting a rig, the catamaran (and trimaran) has a massive advantage. The width allows an increased support angle between the mast and any side stay, which then decreases the loads on the mast and the stays. The Kelsall Cat Rig (KCR), uses the full width of the cat rather than half the width on which the conventional single cat mast is based. Double the angle and halve the load is the starting point, but only a small part of the merits of this unique but very simple rig development.

HISTORY.

Twin rigs on cats are nothing new. The first I sailed alongside was Prout's Ebb and Flow, in the 1960's and I have sailed a few since. Jazz, a French cat in France for example, won the Breste Speed Week just pipping us on 93ft., tri, William Saurin by half a knot. Goal post rigs are not new either. Yves Parlier's was featured in many race reports and a 46ft. Kelsall in S. Africa has one. Then there is the Freewing Twins which Richard Glanville and I devised a few years back, with the mast head strut, allowing the wings and sails to rotate freely under the stays. Freestanding twins is probably the most common. Flying carpet is well documented and sails nicely on my one evening around the harbour.

Our design, "Cool Change" and its demonstration of the performance and handling advantages of twin sails and the freedom from sheeting restrictions, has provided a very strong incentive to pursue this development.

FREESTANDING OR STAYS.

Stays are the most weight efficient way to support any post or mast. Freestanding masts are heavier (usually of carbon), with bury (extra length) and does depend on very well engineered bearings. For me, having an asset and not using it does not sit well. Hence, a stay system which interferes least with the sheeting of the sails and imposes least loading on the whole, was the objective when we started down this route. Sails which do not depend on stay tension impose least loading onto the rig.

COMPROMISE.

The stays/strut arrangement here introduces one sheeting compromise only. The windward sail cannot pass between the masts. As the lee sail can swing 180 degrees forward and be dumped in any sailing direction, I see this as a huge advance on the currently popular, but highly restricting mainsail sheeting on a cat. This compromise, compared to Freewing Twins, is justified by the reduction in all rig loads by 25-30%, by moving the strut down and the increase in roach. When adding the 2.5 – 3.5 safety factor, that is a huge difference in the sizing of all items.

HOW DOES IT SAIL?

To illustrate just one sailing condition - directly down wind, in the typical conditions found in Trade Wind ocean crossing, the KC rig will come into its own. The sails can be wing and wing, forward of athwartships, removing the tendency to broach or

KSS Kittiwake 42 – stays arrangement for a Kelsall Cat Rig.

the unintentional gybe and can be feathered in the squals which are often a feature of trade wind conditions. Downwind steering will be fun rather than the hard work of the conventional rig. A light weather down wind square sail, set between the masts is an interesting option, to further add to the performance. Lifting sails perhaps.

THE STAYS.

The stays we have are – forestays from each strut position, crossing to the bow on the opposite side.; two mast head back stays also crossing to the opposite side; and two aft runners from the strut position, which also cross over, going back to the backstay chainplate positions. The mast-head backstays are taken from a swinging arm which cantilevers the attachment to clear the roach of the sail. The combination of the forestays and the mast head backstays and the cantilever, induce a bending moment into the tops of the masts. This is where the runners are so effective. The lee runner takes the highest load and conveniently operates on the mast which is less able to resist bending due to its angle of rotation to the backstay. Also very conveniently, the lee runner is entirely clear of the windward sail. The backstays will not have a lot to do for most of the time. Both of the runners can be left on while sailing to windward.

The crossed stays come from our work with Freewing Twins. The arrangement of the runners in combination with the lower strut is the novelty here.

Headssail halyards will be fitted at the strut position on the masts. When the rig is carrying a high wind load, the stays to the windward mast will tend to go slack. The opposite to the lee shrouds on a single mast. The halyards will then be taken to the forestay chain plate and tightened to take out any F and A swinging movement of the mast and snap loads on the stays.

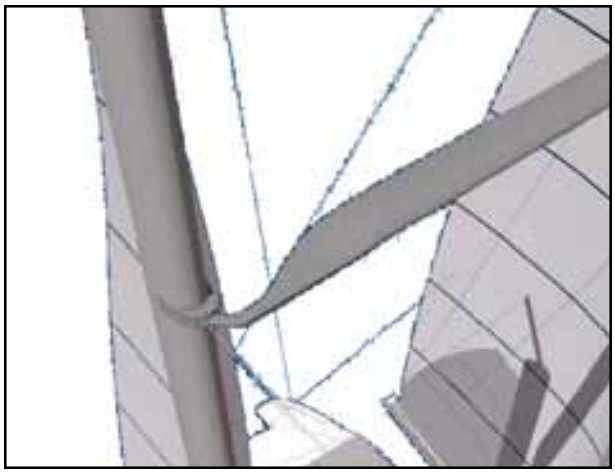
The stays will go to the leading edge of the wing masts. Being fibre, wrapping against the mast will not damage the mast. An extra wear pad will be added to the mast structure where needed. This we have done on rotating race rigs in the past.

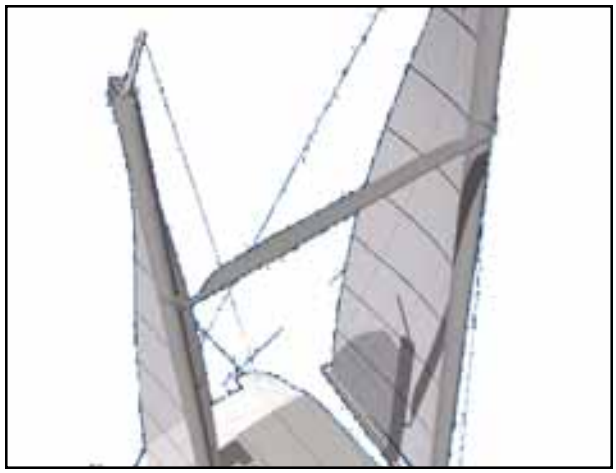
THE STRUT CONNECTIONS TO THE WINGS.

This is the one area which needs to be carefully dimensioned to allow the wing masts to rotate as far as possible in each direction. The fitting we have designed allows the mast to rotate inwards by 75 degrees and outwards by 165 degrees. The boom and sails can rotate further. The connection is a custom designed fork and fork style fitting. This is 240 degrees of rotation compared to about 80 degree for the regular cat rig's main sail, today. While sailing 70ft. My Way, where the owners had chosen to eliminate the runners (the spar makers advise) I had designed, I asked the skipper how far the boom could be let out before the battens hit the shrouds. We checked. It was less than 40 degrees each way.

BOOMS and VANG OR WISHBOOM.

As the end of the boom of the lee sail is outside the boat, there has to be a vang of some kind or a wishboom. The conventional wishboom does not work well with a wing mast. A wishboom will need to be be attached to the mast, just forward of the sail luff track. Cool Change uses a simple rope vang





KSS Kittiwake 42 – strut arrangement for a Kelsall Cat Rig.

and topping lift, which has proven to be entirely satisfactory. We are starting with a fixed vang/boom arrangement. Some arrangements may favour wishbooms. Others may favour a reverse vang above the boom. Where we have a boom and vang hinged from the trailing edge of the wing mast, we move the mast support back on the mast foot, in order to reduce the turning moment on the wing from the load on the sail, boom and vang. Sheeting will be to a block on the centre line of the mast.

COSTS.

We have yet to complete any detailed costing. Obviously, the time involved in custom building spars will be a major factor, though some suitable rotating sections are available. On the other hand, the fittings and stays will be reduced in number and much lighter and less cost. Rigging screws can be replaced by lashings. Stays can be fibre. The chainplates are very simple indeed. The mast pots for rotation are also simple. Halyard winches and runner winches are the only winches needed on under 12m. Two part tackles will handle the sheeting loads up to this size. Ie four small winches in place of 6 or 7 larger on a conventional rig.

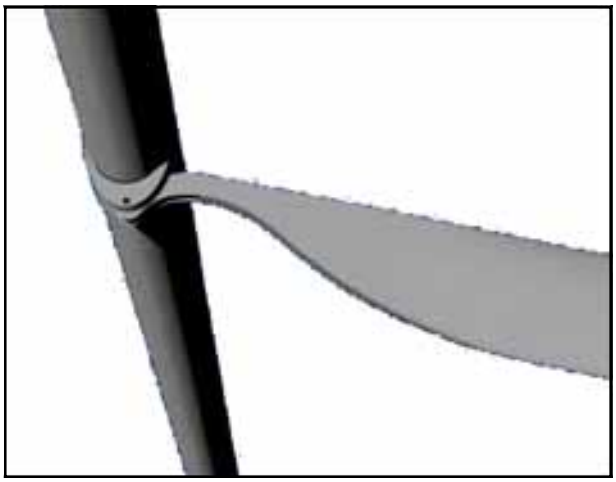
Gone is the need for tracks and travellers and the expensive hardware usually associated. Gone is the need for headsails, where most yachts carry several. Light weather headsails are optional on the KC rig. Cool Change has proven that headsails are not essential for good windward sailing and CC is so effective off the wind that the planned headsails have never been bought. Two main sails will add cost. We suspect, the overall cost will give an advantage to KC rigs. We will be consulting Spar makers interested in supplying.

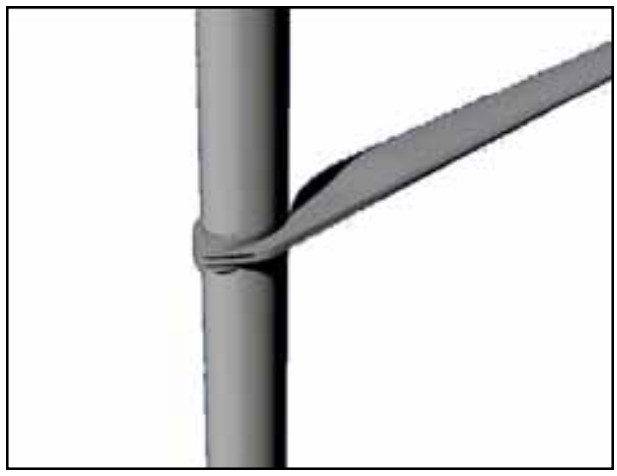
COOL CHANGE.

I cannot over stress the extent to which CC influenced our thinking. At that time, it was stepping into the unknown to an extent and I do doff my hat to Don and Marilyn for their courage in taking this route for their liveaboard/charter future and for the quality of their work in making it themselves. 25,000 trouble free sea miles, easy performance sailing is testamony to their efforts and to the concept. We discussed the Freewing Twins option, but the freestanding won the argument at the time. After their last trip back from Vanuatu, regularly recording 18kts., and a max of 22, the comment was"What an Awesome boat we have" and on KSS – "we could not have done it any other way".

Sailing Cool Change very quickly dismisses the idea that the windward sail blanking the lee sail is a problem. In that situation it only needs a minor change of direction to bring both sails into play. In fact, this feature can be useful in some circumstances. Amazing windward ability demonstrates that headsails are superfluous when the sail/wing shape is right. Anyone wishing to check this out for themselves, contact D or M on <coolchange@xtra.co.nz> for a charter for a day or longer. A charter we can highly recommend.

Once again, we are fortunate in having a client prepared to take on the rig. The first is for a 42 foot modular design nearing completion; KSS 42ma. Two more clients who have seen the rig, will also go this route.





KSS Kittiwake 42 – strut detail for a Kelsall Cat Rig.

WING MASTS AT ANCHOR.

There is now considerable experience of this situation. Richard Glanville learnt that the single wing, as Freewing, is best with the wing set athwartships, whether at anchor or marina. Examples of Freewing, including one on a 54 ft. Kelsall mono in South Africa, have been on the water for nearly 3 decades. At anchor, the twin wing masts are best set with the wings toed inwards. Feathering could be achieved by fitting a tail fin. The Walker Wingsail had this feature. There was no enough wind to test this during the one time I sailed on his first trimaran.

THE MODEL.

The crude model I put together from the bits and pieces lying around in my workshop has proven to be a great asset. It gives a real feel of stability when loading any part of the rig. There is no sense that mast movement would be detrimental. I have always favoured stays which are relatively slack and then tightened with runners or wind loads. There is no need here for highly pretensioned stays.

FASHION.

As a designer, features and shapes which reduce the loads have always been attractive to me. Boats and simplicity go together in my book, whether it is in the structure or the gear. I have never understood how the currently fashionable three stay cat rig could have become such an all encompassing fashion, when it has such obvious down sides. It is heavy, highly stressed, severely restricting of main sheeting angle, a very poor rig for trade wind sailing and it needs expensive controls and it ramps up the loads. The runners which we have always designed for this sail plan have the opposite effect.

This situation is a bit like strip foam becoming the fashion for so many decades when the way we built Toria (46 years ago), some ten years before strip came into common use, gave all the shapes we ever needed in a lot less time, starting with the basic full size foam sheets. Let's hope it does not take more decades to change the cat rig fashion, make full use of the catamarans potential and put more fun into sailing.

SUMMARY.

Comparing the standard cat rig to the Kelsall Cat Rig:

- We have removed the high load of the forestay and the need for multiple headsails.
- We have replaced six heavy, pretensioned stays with six light weight all fibre stays.
- We have two masts and the cross strut replacing a single mast. However, being foils the drag is less and the angle of lift is higher.
- All up weight is similar and probably better when all factors are counted.
- The deck gear needed is a fraction of the weight and cost of that needed for a conventional cat rig.
- The final cost is still to be determined but KCR could well win on this score as well.
- All the evidence is that performance will be improved, but with only two sheets to tend while sailing.

The freedom from the typical sheeting restrictions alone would swing it for me. The total package just makes sense.

TAKE THE LOAD OFF YOUR WINGS.

PS – with a minor mod, the Kelsall Cat Rig makes a very neat rig for a proa.

Derek Kelsall
06.12.11

AYRS News Autumn 2011

Fred Ball

I was at Beale Park Boat Show helping on our stand and taking part in the Cordless Canoe Challenge and was knocked out in the first heat by an open canoe with one of the Hobie drives driven by a single drill driving a pair of cranks working the pedals, unfortunately he was knocked out in the next set of heats, so I can't claim to have been eliminated by the winner, which was an extremely neatly built boat using tortured ply having a fine entry and almost flat aft sections propelled by a single drill driving a large diameter prop. Pictures and a report are in Catalyst 43.

The following week I was helping Slade at Seawork a show where commercial workboats are on display, lots of fascinating things to see, as well as equipment to stand up to the rigors of everyday hard work. Some examples were Marineco Shamal a high speed catamaran work boat by Damen Shipyard and Meercat road transportable workboats 14-18 metres long.

Marineco Shamal was designed for high speed travel in waves up to 2 metres height and with low fuel consumption helped by the high bridge clearance and semi-circular tunnel and Axebow hulls; she also had all the mod cons for navigation and watch keeping the photo of the instrument panel hopefully shows the chart plotter, video display of view ahead, astern and to port and starboard using cameras placed to give best view without obstruction by superstructure and the radar screen.

The Meercat road transportable work boat was in three parts which assembled side by side after launching using a crane to lift from lorry to dock, in as little as one hour. The photo overleaf is of course a model. See also http://www.meercatworkboats.com

Another road transportable workboat was long and narrow which made the wheelhouse rather narrow and to allow ease of access the backrest for the standing helmsman was a crescent shape to starboard

I was also impressed with the claims of Ecospeed an alternative to antifouling where the finish is so good that fuel consumption is reduced and as it does not leach it lasts several years. Underwater treatment every 3-6 months is all that is needed, reducing the need for dry docking to a quick touch up session every 3-4 years

Marineco Shamal

I also came across a gadget for rust removal using an electric drill, it was essentially one or more flexible discs with a series of embedded hard tips at the edge, I intend to buy one and try it and possibly demonstrate it at our November meeting. http://www.tercoo.com/en/products/

Hints and Tips from Tim Glover

The tip that I would like you to try is a method of unseizing a thread; ie a nut and bolt .

In the case that I had just tried; the nut was a knurled nut made of a zinc alloy (the type of metal used for die casting). It was around a stainless steel bolt. I tried a couple of large wrenches, and it was obvious that the bolt was about to break!! So I tried this old trick – heat the outer member with a small blow lamp, and then cool it down with either WD 40 or 3 in 1 oil in a spray can. Then heat again, and cool again. The idea is that when heated the vapour travels further into threads than the liquid would by itself. Anyhow after 3 cycles (trying it gently each time) Hey Presto it came apart easily!!!!

Take care, fire and explosion risk from aerosol propellant and oil.

The next tip….

A friend gave me a beautiful length of st/st cable; so I decided to rerig my big land yacht. So I tried out my new pair of bolt cutters; that I had bought as a pair of safety cutters for freeing rigging in a hurry!! Not only were they not adjusted properly, but even after they had been adjusted they did not cut the cable through in one clean cut – it took a number of goes; ie they did not do what I bought them for!!! When I looked at them more closely I found that the handles came together before the blades actually came together. When I was next in a tool shop I examined all their bolt cutters and found out the answer: the handles on my cutters had been put on backwards; i.e. they bent inwards, not straight or bent outwards like all the ones in the shop. The lesson here is, I guess, as with any safety device: do see if it works before you have to use it for REAL. Has anyone had any similar problems?

Having related my latest problem with the bolt cutters to an old friend of mine he said that to cut rigging away fast a carbide coated hacksaw blade was recommended for this purpose. Anyone agree?

The carbide blade works well and is cheap but it's not quick. The special shears are best. Bolt croppers cut by a chisel action (crushing between sharp edges); the special shears have parrot beak shaped blades to stop the wire squeezing out from the blades, and cut like scissors. They also have specially hardened blades to cope with the severe loads (but are very expensive although they work well in the crisis at sea – FCB)

Two problems with new life jackets. Having bought new crutch straps for my new jackets, I was all set to go sailing. The first time that I tried them out I decided to see how well the new buckles worked, ie did they hold under tension? NO they came completely undone with no force at all! They had been laced up completely incorrectly. So the person who laced them up had never used a life jacket and there had been no safety check.

So do see if my straps had been the only ones that have had this problem?

Next even worse, Having used my jacket for some time I put it on in a bit of a rush, and there was a loud CLANG as the CO2 cylinder bounced across the cabin! Yup, you guessed it: it was not loose, it was not attached AT ALL. It was just put inside the jacket and clipped up. Am I the only one with this problem?

Yet another type of Super Glue.

Normally cyanoacrylate glues work by being in a thin layer under pressure .This one is called Roket HOT, and it works by being in a thin layer . So the way it is used is to assemble the parts to be glued, and simply add a small amount to the edges of the break, it is so thin that it creeps into the joint by capillary attraction. It works well but there is a problem. As it is a very thin liquid so it runs everywhere. I managed to spill some on my hand! Yes, I stuck my two middle fingers together in a flash.

Now the old super glue instructions said separate with a dulled blade … I found this did not work well, but what did work was a medium size screwdriver.

You simply eased the fingers apart and as this was happening the two layers of skin separate leaving an extra layer on one side and a minus layer on the other.

It was not painful if done slowly.

This glue and many other type of things are sold by Deluxe Materials, www.deluxematerials.com. They do sell a super glue release agent as well.

AYRS NORTH WEST AREA FORUM

Report of the Seventh Meeting held on Saturday 17th September 2011

Only four members managed to attend the seventh North West Local Group meeting. Apologies were received from John Shuttleworth, Roy Anderson, Colin McCowen, Peter Gilchrist and Adrian Denye. Peter was busy organising a beach clean up in his home port of Sunderland Point, while Adrian was attending the Southampton Boat Show as an exhibitor with his company, Character Boats. The other absent members, I am sure, were engaged in suitably admirable endeavours.

As usual, the topics discussed were varied and often of a non maritime nature. John Alldred outlined his plan to sink a well in his garden to extract the heat from the ground water to warm his greenhouse. The region in which John lives, the Lancashire Plain, is covered in a layer of glacial Boulder Clay. So far, John has dug down 5.5 metres without reaching the base of the clay layer. Members were asked to suggest a use for the copious quantities of pure clay which John has extracted so far!

Brian Shenstone related the saga of his trip to Germany, earlier this summer, in a 1949 Allard, owned by his brother, and how they overcame bureaucracy and towed the broken down car onto the Eurostar train! He then went on to explain how the car was ingeniously fixed by Monsieur Martin, the proprietor of an "old fashioned" garage in the French country village of Martin. For the next half an hour the meeting turned into the AYRS Vintage Car Club as members related similar stories of their experiences of fixing cars back in the days when you lifted the bonnet you could see the engine and not plastic covers and wires.

The meeting was brought back to order by John Morley, who assisted by Mike Howard, updated the members on the progress made to date on the full size prototype of the Morley Tethered Kite Sail Project. The meeting was told that, after a re-design of the original plan was necessary to reduce costs, a 'self assembly' kit of parts has been purchased and assembly is in an advanced state. It is hoped to have the Enterprise fully rigged by early October. After preliminary testing has taken place in October on the Marine Lake in Southport, members will be invited to view or sail the prototype. It is hoped that testing

Morley Tethered Kitesail Test Rig

can continue through to the end of the year, subject to weather conditions.

Mike Howard introduced the subject of the AYRS Yahoo Discussion Group. However, none of the members present had accessed the website, so Mike outlined the kind of subjects discussed and how his question about Third Party Insurance had almost provoked one member to organise a march to our beaches to re-possess them from the tyrannical Local Authorities.

The meeting closed around five thirty with Mike Howard thanking members individually for making the effort to attend.

Footnote:

It may appear to the reader that, on most occasions, the meetings are rather sparsely populated. However, a consensus of opinion seems to indicate that all of the members (nine out of a possible sixteen) who have attended the meetings of the North West Local Group have enjoyed the experience and think the effort is worthwhile.

AYRS Meeting - 6th November 2011 Thorpe Village Hall, Surrey,

John Perry

Again, thanks are due to Fred Ball for organising this meeting. The attendance was only about 10 members, but despite that, it was an enjoyable meeting with some lively discussion. I suspect the reason for the small attendance was lack of advance publicity - we need to ensure that all our meetings get announced at the various points at which we have a presence on the Internet, as well as in Catalyst.

Fred started the meeting with a set of slides covering his sailing season, including the May get together at Calshot, the Beale Park Boat Show and Cordless Canoe Challenge (CCC), a south coast cruise in his son's yacht, assistance with Slade Penoyre's floating windmill project, the Seawork exhibition and Weymouth Speed Week. This was essentially as Fred presented at our Weymouth meeting, but the Thorpe meeting offered more time to fill in the details.

Fred's presentation initiated discussion about the possibility of an AYRS team entry in a future Cordless Canoe Challenge, and just what form such an entry might take. I have to say that, to me, the Cordless Canoe Challenge is about as sensible as using a canoe paddle to drill a hole in a wall. However, I am more than happy to give free advice, albeit probably also worthless advice. Most of us like doing that I think!

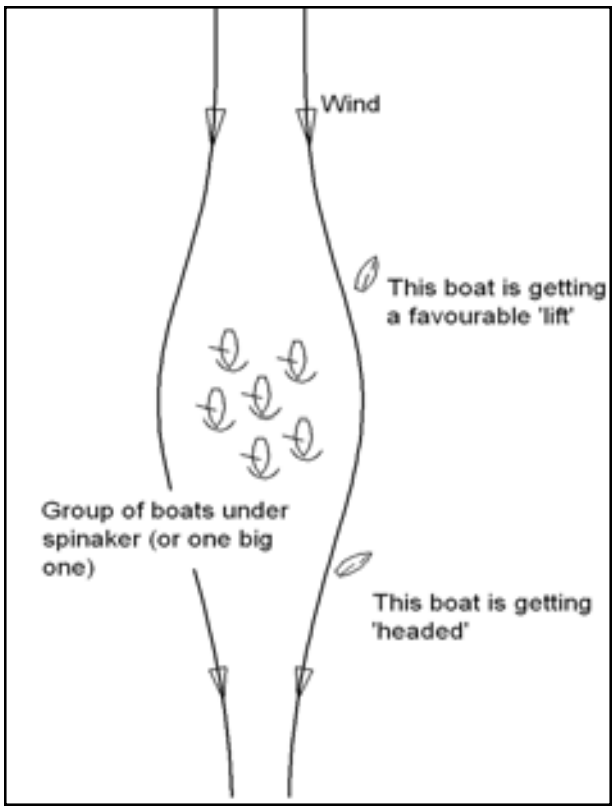
We would need to check that the CCC will be included in the 2012 Beale Park show, and if it is included, perhaps it should not be assumed that the rules will be as for this years competition. Looking at the Beale Park Boat Show website, I see that this years CCC is reported as being a 'huge success' but, at the time of writing, I don't see anything about a repeat event.

Assuming that the CCC is repeated next year, there does seem to be interest from some of those present at the November meeting, and also some relevant expertise. AYRS Chairman, Graham Ward, works in a tool hire shop so he knows what you can get out of a cordless drill before the motor melts or the battery dies. The rules limit the money that can be spent on the cordless tools and Graham's recommendation was to go for a tool in the middle to upper price range. He thought that would provide more power and energy for the money than buying dozens of £9.99 cordless drills and somehow ganging them all together.

The results of this years CCC suggest that a simple, low drag, monohull and an efficient propeller well matched to a powerful cordless drill will give the best chance of success. Some contestants did a lot of work to build hulls specifically for the competition but several members made the point that any long narrow canoe hull should be almost as good. The simplest approach might be to mount the propeller shaft directly in the drill chuck(s) and dip the propeller(s) over the side of the boat, as Fred did this year. However, the winning contestant this year used a conventional shaft arrangement with the propeller shaft running in a gland through the bottom of the hull. Fred did not get to the prize list, but Slade Penoyre won the innovation prize with his paddle wheel canoe, the paddle wheels also being land wheels to make it amphibious. Fred showed video of Slade's cordless canoe motoring down the slipway into the water - it may well have been the fastest contestant at that point.

An efficient propeller that is matched to the available power source seems to be crucial to success. At least one contestant used an outboard motor propeller but these are designed with small diameter and broad blades to avoid cavitation when the power input is high for the available disc area. Several members suggested that the best propeller for the CCC might be a bit similar to the propellers used for human powered boat records, with large diameter and high aspect ratio blades, a large model aeroplane propeller possibly being not far from what is needed. Slieve McGalliard pointed out that good manoeuvrability is also required, i.e. an effective rudder or vectored thrust, since he thought that many contestants wasted a lot of time making the turns round the buoyed course.

After the morning coffee break, Michael Nicoll-Griffith, who was visiting the UK from Canada, talked about the optimisation of windward courses. Michael has written a series of articles in recent issues of Catalyst in which he puts forward a theory that the best course to windward, even with steady wind and no current, is a series of curves between tacks. However, Michael explained that he has revised his thoughts on that subject following discussion with other AYRS members at the AYRS Barton Broad meeting earlier this year. He now accepts that straight courses between tacks are best,



at least as long as wind and current remain constant, which of course they mostly do not.

Thinking about the effect of wind shifts on the optimum course, Michael went on to tell us about an interesting observation he made during a yacht race in which he was sailing to windward and a group of yachts ran past under spinnakers. He noticed that when he was downwind and to one side of this group of yachts, and on a tack that would take him away from the yachts, he was slightly 'headed', so he tacked onto what appeared to be a more favourable tack, heading towards the group of yachts. Then as the group of yachts went past, he noticed that he was again headed, so he tacked once more and gained some advantage over competitors that had stayed on the same tack. He attributes this to the wind bulging out sideways as it flows round the group of spinnakers - as the diagram.

I would add that it is known that wind tends to deflect sideways in preference to deflecting in a vertical plane, this being at least in part due to temperature stratification. For that reason, wind tends to flow down valleys rather than taking short cuts over the hills between valleys. Perhaps it is plausible that wind will divert sideways round a group of spinnakers more than it diverts in a vertical plane.

Roger Dyer was the next speaker, talking about his project to develop a low cost single-handed racing dinghy and adding further detail to the talk he gave at our Weymouth meeting. Roger's work this year has mostly involved the rig. He has developed a sleeve-luff una rig which has a series of semi-flexible sheet plastic formers inserted into the luff sleeve and linked to full width sail battens. This gives an effect similar to the camber inducers used in some windsurfer sails, but since these plastic formers extend the whole length of the luff they better control the luff shape all the way along the sail. John showed some photos of the sail taken with the boat afloat and these did show that the leeward side of the luff pocket, which is perhaps the most important part of the sail for developing lift to windward, was smooth and blended nicely into the rest of the sail. Roger said that the main problem is that it is a fiddle to assemble. At Weymouth Speed Week, Roger was able to fit the formers into the luff sleeve with the mast and sail indoors, then take the rig out to the boat at the slipway. Roger is now thinking about how to simplify assembly so that the boat can be more easily rigged out of doors.

Roger Dyer's talk was followed by lunch and chat. Margaret Ball kindly provided teas and coffees from the village hall kitchen, but one should remember to bring a packed lunch to these meetings. The lunch break also provided an opportunity to browse through some sailing and technical books that Fred and other members had brought along to the meeting.

The presentation following lunch was by the author of this report. One of the main sailing interests of both Josephine and myself is coastal cruising in a small cabinless sailing dinghy – we use a tent hung from the boom as a cabin at night. I showed some slides from our cruise earlier this year, I thought it would make a change from talking about designing boats and modifying boats to talk about actual sailing. Earlier this summer we attended the popular biennial sailing festival, Semaine du Golfe, at the Morbihan, and after that festival we cruised along much of the southern Brittany coast, one of my favourite sailing areas. This is also the heartland of the French multihull ocean racing fraternity and I talked a bit about the 'City of Sails' at Lorient, a permanent exhibition of modern sailing craft and sailing achievements.

To include something that might be considered yacht research, I also mentioned some tests I carried out on two small solar panels that I am thinking of fitting to our sailing dinghy to help keep various hand held electronic gadgets charged while we are away cruising. I have a device made by a company called Power Traveller, this containing a Lithium Ion battery and electronic circuitry to allow it to deliver current at a selectable voltage to charge different electronic gadgets. I think there are comparable devices made by at least one other company. The device has about 10amp hour capacity when set to 12v output, so it is about 25% of the capacity of a typical car battery, but it is considerably smaller and lighter than a quarter of a car battery. The device can be charged from the mains or from a solar panel, a 10W solar panel being the recommended minimum. I acquired two small 5W nominal output solar panels designed for marine use, thinking that it would be easier to mount two small panels clear of shadows rather than one larger one. I tested the panels in the garden around noon on a clear sunny day in May, using a pocket multimeter to measure voltage and current. Even with the load reasonably well matched to the output of the panels, under these near ideal conditions the panels delivered only arround two thirds of their nominal power and one panel consistently produced more power than the other which seems strange. Shading even part of the panels, as is inevitably likely to happen at least some of the time on a sailing boat, could reduce the output to next to nothing, although this seemed to depend quite a lot where the shadow fell on the panels as well as on the percentage area that was shaded. I think I need to do some more tests next spring before deciding whether it is worth using the panels on the boat. Since we plan a cruise in Dutch waters next summer, and there are plenty of marinas in Holland, it may actually be more practical to charge up every few days from a marina power point.

I also demonstrated our water-resistant smart phone loaded with the Navionics chart 'App'. We needed a new phone anyway and the Navionics App costs only about £20 for detailed charts covering a large part of Europe. Since the smart phone has a built in GPS, this gives us a chart plotter at a fraction of the cost of a proper yacht-style chart plotter. During our cruising this year, we found the smart phone generally more practical for use at sea on an open boat than paper charts have been in the past.

There are some limitations though, for one thing, dollops of seawater splashing across the touch screen make it unusable since the screen cursor jumps about, it needs to be kept away from heavy spray and the screen wiped dry from time to time. It is also a bit hard to read in bright sunlight, and some of the text on the charts is too small to read when your eyes are tired with the glare of sun on sea. Even so, it is remarkable technology and, sadly perhaps, it greatly de-skills the work of a small boat navigator.

AYRS - Looking Ahead

An imminent move within Kyiv has required me to do some ruthless weeding of my paperwork, and I'm afraid I'm having to ditch many copies of past Catalysts. But not ditching to land-fill, rather leaving in dentists' waiting rooms, informal pub libraries.... you never know.

But the process of glancing through these old copies has led me to make what I hope some positive suggestions re AYRS. But first the negative impressions:-

1) Membership is stagnating,

2) The variability of the standard of the contributions is increasing, &

3) Much too heavy a burden is being carried by some members of the Committee.

..... to which I'm offering the following ideas:

a) Catalyst could improve in quality, but not in quantity, by emulating some features of academic journals by promulgating the following default response to submissions:-

"Your recent submission has been received with thanks. Before the Editor can considering this further, please obtain an informal 'peer review' from someone with greater or equal relevant expereince than yourself, eg your supervisor if you are a student, your boss if you are working in the boating industry, a committee memberof your sailing club, or one of the following AYRS members....

After this, please study the format of other articles in Catalyst, and ensure your email address appears under your name at the top of your contibution before re-sending it to the Editor."

Promising new authors should also be sent infromation about the Howard fund, which seems to be attracting less interest than it deserves.

I'd be happy to volunteer as a peer reviewer; although 'Yullah' is the only topic I can discuss with any authority, I do have wide experience of reviewing undergraduate technical reports.

b) For other purposes I've just been studing the website openbookpublishers.com. This makes me wonder if AYRS need continue the printed publication of booklets, with all the administrative burden these incur.

Mike Bedwell

[*Response by the Editor -*

At present, all articles (but not press releases) are peer-reviewed, either by me or by others as I feel the need. I've been a member of AYRS for 40-odd years, I have a degree in Engineering, and am a registered Chartered (i.e. Professional) Engineer. I don't often reject articles for reasons of writing style, although I reserve the right to correct grammar as necessary. I do reject articles where the science is unsound e.g. perpetual motion machines. Not all articles come by email (though most do); some come through the post.

As far as printing is concerned, the only thing we print is Catalyst. We have two rooms full of the old booklets and have no intention of printing more of those. (If anyone can help reduce that stock, short of pulping it, it would be appreciated!) As people ask for copies of articles from out-of-stock booklets, I scan them and of course keep the scans. At present I have about half of our past output scanned; it takes up about 1.5GB of disk. There is no reason why that could not go on the web apart from the amount of storage we would have to rent: the cost would take some 10% of AYRS annual budget to host on a commercial server; less if we hosted it privately, but of course we would not then get the same performance and response time.

There is, and has been for some time, an on-going debate within your Committee as to just what kind of a web-presence AYRS should have. At the moment, we have a basic website of information, with rudimentary on-line purchasing facilities, an index to articles in the booklets, a set of past Catalysts, the most recent of which are protected with passwords to restrict access to paid-up members, and of course the discussion group that we maintain on Yahoo (http://tech.groups.yahoo. com/group/ayrs/). It has been suggested in the past that we should have a more sophisticated web forum, where we could host not only threaded discussions, but also technical papers and associated comments and authors responses. Unfortunately, building such a beast is outside my skill set, outside the skill sets of the rest of the Committee, and we have yet to find someone with the requisite skill set who is willing to build, maintain, and administer such a beast free of charge and for a substantial period of years. There are plenty of people who can do it, but they all want money!

Volunteers and those who would like to pursue this point should note that the AGM is on 29th January 2012. You could also raise it in the Yahoo group.]

Catalyst Calendar

This is a free listing of events organised by AYRS and others. Please send details of events for possible inclusion by post to Catalyst, BCM AYRS, London WC1N 3XX, UK, or email to **Catalyst@ayrs.org**

January 2012

6th – 15th London International Boat Show and

12th – 15th The Outdoor Show
EXCEL Exhibition Centre, London Docklands. AYRS will be there. Helpers are wanted to staff the stand, sell publications and recruit new members. If you would like to help (reward: free ticket!) please contact the Hon Secretary on 01727 862268 or email office@ayrs.org

29th All-Day AYRS Meeting
9.30am-4pm, Thorpe Village Hall, Coldharbour Lane, Thorpe, Surrey (off A320 between Staines and Chertsey – follow signs to Thorpe Park, then to the village).
Tea and coffee available but bring your own lunch. Donations invited to pay for hall. Further details from Fred Ball, tel: +44 1344 843690; email: fredcball@btinternet.com.

29th AYRS Annual General Meeting
4pm, Thorpe Village Hall, Coldharbour Lane, Thorpe, Surrey (as above).
Note: Items to be considered by the AGM, including nominations for the Committee MUST be received by the AYRS Secretary before 22nd January2012 (post to AYRS, BCM AYRS, London WC1N 3XX, UK, or email: secretary@ayrs.org)

March 2012

3-4th RYAVolvo Dinghy Show, Alexandra Palace London
Many sailing dinghy classes and beach cats will be on display, dinghy skill lectures and demonstrations, new fittings and bargain sailing kit. For details see www.rya.org.uk

10th AYRS South West Area Meeting
Meet at 16:00 at John and Josephine's at Wembury for light refreshments preceding an evening of presentations and discussion on boating subjects - contact John Perry by phone or email for directions. Let John know if you have an idea for a presentation, even a very short one, that you would be prepared to contribute.
Any members who would like to join in a coastal walk during the afternoon before the meeting should come to Bovisand beach cafe (Grid Ref SX492503) at 13:30. We propose to walk the coast path from Bovisand to Wembury, about 4 miles, then drive the drivers back to the cafe to collect cars.
Contact John Perry - 01752863730(L) 07729334325(M) j_perry@btinternet.com

April 2012

29th Beaulieu Boat Jumble
The National Motor Museum, BEAULIEU, Hampshire, UK. AYRS will be there!

May 2012

5th –7th *Broad Horizons* – AYRS Sailing Meeting (provisional date)
Barton Turf Adventure Centre, Norfolk UK, NR12 8AZ. Contact AYRS Secretary AYRS Secretary, BCM AYRS, London WC1N 3XX, UK; email: office@ayrs.org. Note: All boats limited to 1.2 metre max draft!

14th -18th Boat trials, Weymouth
Probably at the Portland and Weymouth Sailing Academy. Contact: Norman Phillips email: wnorman.phillips@ntlworld.com; tel: 01737 212912.

June 2012

8th -10th Beale Park Boat Show
As usual we will have a stand and would appreciate small exhibits and display material and of course offers of help to run the stand. Contact: AYRS Secretary, 01727 862268, email office@ayrs.org

October

6th-12th Weymouth Speedweek
Portland and Weymouth Sailing Academy, Portland Harbour, Dorset UK See www.speedsailing.com

8th "Speedsailing" AYRS Weymouth meeting
19.30 for 20.00hrs, probably at the Royal Dorset Yacht Club, 11 Custom House Quay, Weymouth. Map: www.rdyc.freeuk.com. Contact: AYRS Secretary, BCM AYRS, London WC1N 3XX; email: office@ayrs.org tel: 0780 820 0987 before going just in case the location changes!

AYRS Annual General Meeting 2012

Notice has been given that the Annual General Meeting of the Amateur Yacht Research Society will be held on 29th January 2012 in Thorpe Village Hall, Thorpe, near Staines, England, starting at 16.00 hrs. All members and their guests are welcome to attend, but only paid-up members may vote on resolutions.

The business of the meeting will include the following, not necessarily in this order:

1. Receipt of apologies for absence

2. Minutes of the previous AGM

3. Chairman's Report

4. Treasurer's Report and Approval of Accounts

5. Election of Officers and Committee members

6. Appointment of a Reporting Accountant

7. Any Other Business

Relevant documents will be posted on the AYRS website www.ayrs.org.

Matters for discussion under Item 7 should be notified to the Hon Secretary as soon as possible. Email hon.sec@ayrs.org

Any queries should be addressed to the AYRS Office, email office@ayrs.org.

Catalyst — *a person or thing acting as a stimulus in bringing about or hastening a result*

On the Horizon . . .

More sources and resources: reviews, publications and Internet sites

Amateur Yacht Research Society
BCM AYRS, London WC1N 3XX, UK

Printed by Printflow, London EC1V 7JD