Catalyst

Journal of the Amateur Yacht Research Society

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Features

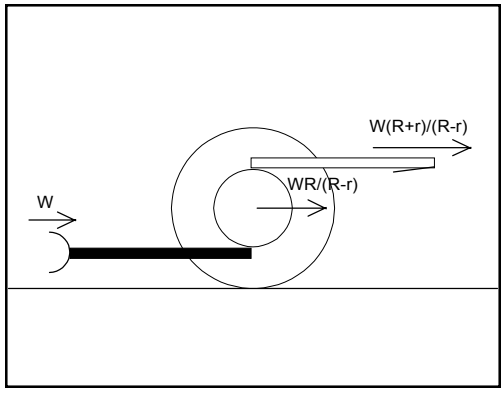
Regulars

AYRS News

Cover photo:

The Australian ocean racer AAPT tries out its new kite-spinnaker

Photo: AAPT & Kiteship



Catalyst

Journal of the
Amateur Yacht Research Society

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Kites are part of the future

The January edition of *Catalyst* tends to have a bias towards sailing fast, if only because it carries the report of the AYRS-sponsored Speedweek at Weymouth. This time we have not only Speedweek to report (with a new Weymouth record set) but also news of a new World record set in the French trench by Finian Maynard.

However, the comments by Bjorn Dunkerbeck at Weymouth, by Finian in his article and the crash of *Macquarie Innovation* in Australia show that taking the record much further is very difficult indeed. The windsurfers are at the edge of their physical ability to control rigs and boards, conventional foils are coming up against the onset of cavitation (the hydrofoil equivalent of the sound barrier), and all of them are running at speeds where even small waves make things at best uncomfortable, at worst impossible.

It was very noticeable at Weymouth that the kiteboards were running as close inshore as they dared – sometimes in less than two feet (60cm) of water. With their sails high up, they could do this and still get drive –windsurfers that close to the bank would have been in its lee. When the kiteboarders have spent the time and resources on improving their craft that the windsurfers have spent on improving theirs, it is probable that they will take the record.

In the meantime those of us who potter around at five knots in monohulls might wonder what it all has to do with us. Kiteship's work (reported here) shows that there is indeed some relevance. In fact the action of the ORC to ban kites from ocean racing shows that they too think kites have some potential to improve monohull performance. It's a pity that they are so frightened of the future that they don't wish to know about it.

Simon Fishwick

AYRS AGM

Notice of the AGM is on the inside back cover. If you want to join the Committee, or edit *Catalyst*, please contact the Hon Secretary, email: ayrs@fishwick.demon.co.uk or phone +44 (1727) 862268. You don't have to live in the UK - Dave Culp functions very well from California!

New World Sailing Speed Record

A new outright Speed World Record, the British, Dutch and Australian (windsurfing) records along with a fantastic new production board world record have all been accomplished in the hard-core 'French Trench' in the Camargue region of France.

What a fantastic but gruelling two days of rugged and psychotic conditions that actually went unsailed a lot of the time because the wind was blowing too hard for the equipment that we all had. 5.0's were too huge -- just to give an idea of what we were facing -- and that is what the smallest sails were for the most part. In fact, a modern 4.0-4.4 would have been the preferable size for just about everyone as we got hit by afternoon stretches on both afternoons whereby there was a solid 50-knots gusting to 60 for literally two hours at a time.

It was nuts and the lid literally flew off the top with the wind gods. Unfortunately the angle we were asking for was too much (130-140) as big chop developed on the course making it very difficult to go fast.

Survival was the name of the game sometimes but breaking the record further requires calculated control, power and finesse, which is simply impossible to achieve in unison with the Mistral. The wind is far too irregular and twitchy to be super fast, fast enough for 50. We are looking for the big SE for that but it is clear that all the sailors were pretty happy with what we got and simply making it through the experience without injury!

Well done to the entire MOS team of sailors, organization and management for a job well done.

Hats off to Karin who came with .25 of a knot of the women's outright record. She sailed so well in the hard conditions. Well done Dave White who shook off a bad accident a while back and set a very fast new GB and Production record and mention should be made to Benny who proved that he is a real up and comer in speed with his instant Dutch record. Watch out for him. Steve showed his skills holding down a 5.4 on Saturday and he is keen for some further SE wind.

Now the focus turns to really turning it on and getting farther towards the ultimate…. 50.

It won't be easy that is clear but we are on the right track so we stay to fight another day.

Yellow Pages was broken twice (once on Sat., once on Sun.) just to confirm that the time is now for windsurfers to take the level higher and higher.

The best two times of the riders who ran are: Finian Maynard BVI 46.82, 46.60 (Outright World Record); D. Garrel FRA 44.21, 43.23; D. White GB 44.03, 43.44 (British and production board record); B. v.d Steen NL 43.71, 43.02 (Dutch record); S. Allen AUS 43.48, 42.09 (Australian windsurfing record); M.v.Meurs NL 42.11; J.B. Gautier FRA 40.55 40.20; T. Bielak FRA 39.66; Karin Jaggi SUI 39.80, 38.04; F. D'Urso ITA 39.35, 38.96

Finian Maynard, new world record holder writes:

The forecast was big for a few days but I had seen them drop out before so I was nervous if it would hold or not. The isobars were crunched on every pressure map so I knew that we would get something and that was reinforced the night before when every TV weather channel were claiming 120 km/h winds right down the middle of the Rhone valley.

From what I had heard the Mistral was a hard wind and hard to go fast in so 50-knots would probably have to wait. What arrived was beyond my wildest dreams and everyone else's for that matter. There were stretches of wind that were almost

hurricane strength with a bright blue sky! We had gotten the real Mistral, the true French wind that is so famous worldwide.

When we arrived at the beach it was clear that it was going to be a good day. When we opened I went down the run with my big board (37.5 w/ 24 fin) and my 5.4. The speed was 43.5 but I could already feel that this course was much harder than the SE and I wanted to get on smaller stuff immediately. I had to work so much more and the little gusts all the way down coming over the land were super tough. They are invisible basically so it is just a feeling and a hard-core one at that. The power surging that I felt last December 3rd when I beat 46-knots for the first time was tiddly-winks compared to this rugged North wind.

I switched down quickly to my 5.0 and tiny board (33) after several more runs that were between 43 and 44.5. I just wanted to get rid of as much surface area as I could because it was simply easier to hold down.

For those who are curious I have set a new unofficial GPS world record with a top speed of 49.3 knots!!! When I saw that and after Roger of gps-speedsurfing.com analyzed my run it was clear that I actually was averaging 48-49 knots for 400 meters of the run and I had a dip of 100 meters where I went down to 45 knots. As Erik puts it that is the 'Mistral dip' that happens just after the midpoint of the run so that is why my run ended up at 46.82. It was technically faster than that but that is the hard part of the 'average' speed calculations. One must maintain it over the full 500 meters.

Sunday morning the wind was still cranking and we arrived at the beach to 40-45 knots with 50-knot gusts soon after and a nice angle. On my second run I had a good start on a solid gust and maintained the speed through the middle this time only having a small let down in the last 50 meters but the time was fast and it was my second time over YP with a speed of 46.60. I did runs after but they were only 42-44 knots and not fast although the chop on the course made them all feel like 50! The wind then picked back up again to 60-knots at about 1pm and it stayed like that until 3:30pm……it was almost surreal. I had never seen anything like it. Not in Gran Canaria, not anywhere. We all sat at the end of the run trying to go but it was too much. I was done, absolutely finished so I sat and waited out the next 90 minutes until 4:30pm when we decided to call it. The temperatures were dropping quickly and everyone was ready to get back to the house and relax.

Finian Maynard

New record at Weymouth too

For once the wind blew at Weymouth this October. Over 2300 runs were timed, and a new record set. Most of the fast runs were at the beginning of the week as the wind lightened for the last two days.

The best run was made by Bjorn Dunkerbeck, and was 36.18 knots – a new record for Weymouth. In fact Dunkerbeck put in the fastest 15 runs of the week, all of them over 33.9 knots.

Second place went to kiteboarder Jeremy Waitt with a run of 33.78 knots made in an average windspeed of only 16 knots.

Third fastest was boardsailor Dan Ellis with 33.41 knots, followed by David MacInnes (33.19), Allan Cross (33.03) and Rob Stack (33.03)

Of the kitesailors, second fastest was Ian Gray at 32.92 knots, third was Dean Morgan at 32.85.

Fastest boat was Malcolm Barnsley's *Sailrocket*, which Paul Larsen piloted to a top speed of 25.33 knots, making a total of 6 runs of over 20 knots. Second fastest was Richard Jenkins' *Windjet* with a top speed of 20.4 knots. Other boat results were: Neils Haarbosch on *Flaxcat* (16.78), Arthur Lister with his Foiled Catapult (16.66), John Pepperel on a standard Catapult (14.62), and Torix Bennett with a new 10m catamaran (12.15).

Dunkerbeck's run of 36.18 knots takes away the record from Crossbow II who set a speed of 36.0 knots (at the time a world record) back in 1980. The fact it has taken 24 years to break that record shows just how infrequently conditions are right at Portland.

At the evening AYRS meeting held during Speedweek, Bjorn explained the difficulty of achieving high speeds on sailboards. Firstly the winds have to be right – steady winds of 25-40 knots – and then the water has to be flat. At 40+ knots,

Sailrocket

sailboards are on the limits of controllability, and the slightest upset can ruin a run. He had been experimenting with "chop-breakers" – devices floating on the surface of the water to reduce or eliminate wind-driven waves. To protect a record length course, a chop-breaker of over 750m length (nearly half a mile) was needed. The logistics of handling and deploying this can only be imagined!

Malcolm Barnsley's *SailRocket* (see http://www.whbs.demon.co.uk/sr2) has been described before, in *Catalyst* No 4. Inspired by the ideas of Bernard Smith, it has a canted 22 sqm sail set to leeward of the hull, which carries a canted 0.08 sqm foil. Developing the craft had been already a five-year project, and by the beginning of Speedweek they had had 11 days on the water and achieved a top speed (by GPS) of 31 knots. Paul Larsen explained that SailRocket was like no other boat he had sailed before. The sail has so much power that it can override the rudder, and steering is very difficult! Nevertheless, they were making progress, and were happy with what they had done.

Richard Jenkins and his *Windjet* Project team are tying to take all three sailing records – on land, on ice, and on water. On land they have already exceeded 125 miles/hr. Ice is more difficult, chiefly because the window of opportunity (right wind, enough ice, right temperatures) is so very small. Whilst waiting for the winter they were concentrating on the water record, which they felt was the most difficult. Their craft (see http://www.windjetproject.com) was inspired by James Labouchere's *Hydrosled*, a lightweight hydrodynamically and aerodynamically stable craft towed by a "kite". At the speeds they hoped to achieve, foil ventilation was a definite problem as shown by the experience of *Yellow Pages* and of the windsurfers, so they had fitted supercavitating foils. They would be draggy at low speeds, but OK over 40 knots. Similarly, they had designed their craft to run in waves, thus avoiding the need for a "chop-breaker". Their kite would eventually be a semi-rigid wing, but for the time being they were learning where the problems were by using a soft (Naish 20m) kite,

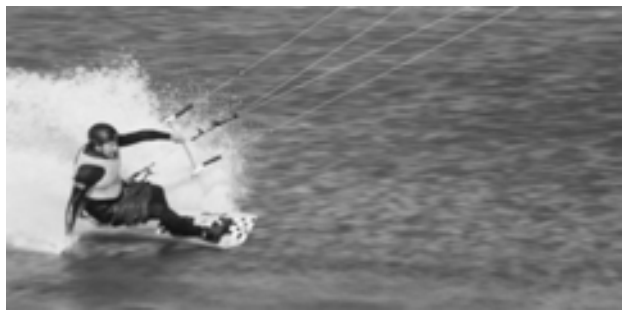
Windjet

controlled from within the cockpit of their craft, which was moulded from a glider fuselage. They had had only a few days on the water and were still learning. (In fact their 20 knot run was the only one they recorded.)

The hulls of Torix Bennett's *Sea Spider* were destroyed in a road accident, so he has built a new craft – a stepped hull catamaran – using the old rig. He is having some difficulty getting the hulls built down to weight, and during Speedweek one had delaminated. He also has a problem with the rig, which is not as flexible at the top as it needs to be.

Niels Haarbosch had returned this year with *Flaxcat*. The boat was initially built as a technology demonstrator for flax-reinforced resin construction. Flax is only 30% the weight of glass, but has only half the strength, necessitating a thicker, but lighter, laminate for the same performance.

Other people spoke too at the evening meeting, but we are hoping to get them to write longer articles for *Catalyst*!



Stop Press - Macquarie Innovation crashes!

As we go to press, we hear that *Macquarie Innovation* (successor to *Yellow Pages*) has crashed whilst attempting a record run in Australia. Neither crew member was seriously hurt, but the boat has been completely destroyed. Apparently the front hull lifted and spun out and hit the bank, cartwheeling the whole craft.

THE CASE FOR A NEW MUG

Congratulations on Charles Magnan's and AYRS's excellent initiative. My two cents worth: If development is the name of the game, then limited sail area/unlimited length will achieve more than limited length/unlimited sail area, which has already been done to death. It is established that a multi slot wing sail is fastest, followed by no-slot wing sail, followed by una rig, followed by sloop. However, ask any two people which hull configuration is best and you will get multiple answers, and one of them will be the longest possible.

My specific interest is in proas. These have the least possible boat, for a given length, and are at least potentially quicker than cats or tris, particularly if the rig on small versions is on the windward hull. They also have the added property of not needing to tack, which may (or may not, depending who you talk to) allow faster hull shapes.

The limiting factor on cats/tris is nose diving. It would be interesting to see how long they need to be to overcome this.

I also have an interest in kites. A specific upwind sail area and a specific downwind sail area would allow development of these. Unlimited downwind area will be very expensive as kite size is not related to capsizing/nose diving loads.

Rigs are more expensive than hulls, particularly sails which need to be replaced regularly. The experience with the skiff classes is multiple rigs, not reefing. With a limit on sail area, the multiple rigs required will be smaller, and dependent on the max sail area chosen. Viable second hand rigs from the wealthy owners will become available for the experimenters.

No matter how much sail area is allowed, the good guys will learn to handle it; the less good will provide the viewing excitement. The good guys in a lousy boat will beat the rubbish guys in the clever boat. The guys with lots of money may well beat both. If we are looking at developing boats, not sailors or bank accounts, then massive allowable area is not a good thing. Maybe 180 sq ft/ 16.75 sq m upwind is more than enough, plus 50% of this for downwind, assuming a two handed class. Breakages on large sail area boats are also going to be more regular, and more expensive.

Sail area limits may allow owners of other class boats to compete as well. It also provides a benchmark. If a 17 sq m craft can beat a 22 sq m Tornado, then we know we are making progress.

Specific comments on Charles' article: 1) The C Class cats have always been dead, or dying, then along comes someone else with heaps of money and some good ideas. 2) You will not limit costs without limiting rigs. The 18' skiffs in the '80's are the prime example of this. 3) I agree that 20' is the common size in dinghy parks, but have not seen any where a 25 footer would not fit. A Tornado weighs 160 kgs, needs 2 strong men to handle it. An 18' skiff takes 3 strong men to launch. Our 25' proa weighs 100 kgs/220 lbs, and is telescoping. A serious race version would weigh less, and be much easier to rig and launch than either of the above. 4) A possible way to encourage sensible rigs would be to start the race on the beach, with the boats on their trailers, unrigged. 5) The Tornado is a B class cat, length and sail area restricted. 18' skiffs are the same, as are F20 cats and other skiffs. To do something really different, drop the length requirement. 6) Kites which are not easily flown will not be used. Leave it open, and let evolution sort them out. 7) Proas can shunt almost as easily as beach cats tack, and with a lot more precision. The double arrow is an amusing idea, though not really necessary. The penalty turn idea is an excellent one.

r*egards,*
Rob Denney

Observations & Suggestions

Of course there must be more room for development classes for those sailors who don't just want to sail "out of the box" boats, and who think they can improve performance by design as well as through practising their skills. There are some popular "development" classes like the International Moth (see later comments) and International 14 etc. that do allow for individual design innovations, but these still have quite a few limitations in their rules. I can't think of any class that offers the degree of freedom or inspirational encouragement that is proposed here. Surely there must be room (and a need) for a class that offers a chance to exercise our imaginations as well as our muscle.

Number of Crew: There was no mention made in the proposal as to the number of crew, perhaps two (helm and crew) was assumed, but I think there should be a limit. An unrestricted (or over-generous) crew number, if combined with an unrestricted (or over-generous) sail area, will only encourage the "more power" approach – large sail plans balanced by half a dozen heavy crew members all trapezing off racks, like some of the super-skiff classes that have been seen in recent years. The real problem with this is that it begins to put the emphasis back towards the crew rather than the boat: to win you will need to put together a large team that is highly trained, super fit and probably professional. This not only introduces huge cost implications (wages, accommodation, food, transport etc.) but also removes the class from those who do not have the opportunity or the resources to bring such teams together on a regular basis.

I think that this class should be aimed at a normal crew of two, or perhaps allow three provided that the combined weight of the three doesn't exceed a reasonable amount (e.g. 400–500 lbs.). This would allow women and mixed or younger crews to compete weight-wise with two "hefty fellows". A quick thought: The carrying of extra personal ballast (e.g. weight belts/jackets etc.) should be allowed outside of these weight limits, but for safety reasons all ballast equipment should not adversely affect the crew's buoyancy (e.g. a jacket with water-filled pouches would be allowed, but one with lead weights would not).

Rig, Sail plan and area: Although I appreciate and agree in principle with C.M's basic concept of free and unrestricted rigs, I feel there has to be some limits set on these.

I notice a couple of potential problems with the proposal concerning wing-masts (though I'm sure this can be tightened up). The first is the question of defining what is a wing-mast and what is a wing-sail, and the second with manipulation of the 20% rule. For example, if I wanted a wing-sail of 10 sq.m. (which was not weathercocking through 360 deg) it would not be allowed, but if the same wing was said to be a wing-mast for a sail of total 50 sq.m. then it would. Furthermore, if I then decide that the wind is too strong and that I should reduce the area by reefing or attaching a smaller sail, then the wing-mast is now greater than 20%. What then? Is this OK? If so, I will design a rig with a massive sail area which will only be used in the lightest of winds; but in practice I will be running the wing-mast with only a token "cloth" sail element.

I put this as an example of how to get around well-intended rules. I certainly would not want to see solid sails (wings) or wing-masts banned, which would not be in keeping with the spirit of the class, but I understand the safety concerns for non weathercocking wings. Surely the intention of the 20% is to limit their size. Therefore, either limit the overall sail area (so that 20% of it is a reasonable amount) or change the restriction to a maximum size rather than a percentage.

Personally I would not be in favour of an unlimited or over-generous sail area. It is almost inevitable that boats will be designed around sail plans that utilise the maximum area available to them. Too large an area would probably require large specialised custom-made carbon masts and need a wide selection of sails to maximise performance in a variety of conditions. Apart from the obvious cost implications, there isn't the same impetus to develop efficient and effective sails as there would be with a more restricted area. The highly successful Formula 18 cat class has a sail area limit of 21 sq.m upwind and 21 sq.m gennaker, and this seems more than adequate.

Free-flown kite sails (i.e. those not attached directly to the mast) offer advantages on certain points of sailing in that they can operate at a greater height where the airflow is both stronger and more consistent. However there is also potential danger: lose control of a conventional spinnaker or gennaker and you might have an embarrassing capsize; but lose control of a traction kite and the tether/control lines could cause injury or death to adjacent crew and boats. If kites are to be permitted they must be kept on a short and very tight rein.

Generally there should be some sort of limit to the space that the boat and its peripherals occupy on the water. Extremely tall masts present a hazard to other boats during a capsize, and after capsize are difficult to recover, leaving a large obstruction on the course. Likewise, excessively long booms and bowsprits could force other competitors to yield more sea-room than would be fair or desirable for racing.

As a potential solution to the problem of how to prevent sail plans from getting too unwieldy, whilst still allowing the designer a high degree of freedom in form and development, I would like to suggest the consideration of a "box rule" as follows:

Box Rule NB: Any dimensions stated below are only suggestions and to be considered in addition to the normal hull dimensions, not to supersede them.

The basic concept is that all aspects of the boat – hulls, foils, extensions, masts, booms, bowsprits, rigging, sails (of whatever type, including kites) should at all times be contained within the limits of an imaginary rectangular box. The dimensions of this box are to be established around the boat while it is floating at rest and level, and its orientation parallel with the boats fore and aft direction.

Height: The ceiling or lid to this box is to be at a height of 11m above the water line.

Length: The front wall of this box to be 3m beyond the foremost part of the boat's hull as defined by the hull length rule. Similarly, the rear wall of this box to be 2m beyond the rearmost part of the hull as defined; alternatively 8m behind the front of the hull, or 11m behind the front box wall.

Width: The side walls of this box are to be established 6m either side of the boat's centreline. In the case of asymmetric hull forms (e.g. Proas) the centre to be considered as the mid-point taken at the boat's maximum width. (This width limit may seem unnecessarily generous, but room must be allowed beyond the hulls for the booms of multi-masted configurations where the masts are mounted side by side at the edge of the hulls e.g. "Team Phillips", "Quatrafoil" etc.)

Rear Foil(s) Regarding the use of a rear foil for the purpose of pitch stabilisation or part of a lifting hydrofoil system: The working rules as outlined in *Catalyst* state that all hydrofoils must be "contained within the LOA and BOA limits" yet the rules contradict this if the foil is part of the rudder ("*excluding* rudders and hydrofoils integral thereto"). I see no reason why a foil independent of the rudder cannot be permitted outside the LOA. The most common method used for deploying these foils is to incorporate them into the bottom of the rudder (these "T foils" are used on many International Moths).

Combining the foil and the rudder is the most likely choice for a designer, but it is possible that for structural/strength reasons he may prefer to keep the two elements separate. In that case, why should he be further disadvantaged by having to keep the foil within the LOA? Surely the basic safety consideration is not to have any appendage projecting too far from the rear of the boat, and this aspect could be controlled by the above box rule.

The Course The task that a machine is asked to perform is the determining factor when considering its design, hence the type of course that a boat must sail has a huge influence on its form. To promote innovative development it is vital that the course includes a significantly long leg, set as close into the wind as possible. This will encourage boats that have the ability to sail close to the wind and tack quickly. A similar argument can be made for a leg straight downwind. Whatever is decided, the type and balance of the course are crucial to craft design.

I think this concept is an excellent idea and should attract a great deal of interest. However, there will always be those who can afford more than others and, though cost has been considered with this proposal, if this class becomes successful it is likely that the money needed to be competitive will escalate, and the financial requirements may exclude many who would otherwise participate.

I therefore wonder if it is worth considering a smaller and cheaper class in addition to (not instead of) the 20 foot class – giving a kind of Formula 1 and Formula 2. The smaller class would basically be a scaled-down version of the 20 foot, but perhaps with an additional restriction on the sail rules, to prevent sails being changed during the race. This restriction would prevent the use of down-wind only sails (spinnakers etc.) but would have the advantage of lower costs, and would allow the boat to be set up for single-handed sailing if desired. Perhaps something in the order of 15 foot length and 16 sq.m. sail area. Just think what the Moth sailors have done with a 11 foot monohull and a small una rig!

The International Moth class has proved itself over many years. This development class, despite certain restrictions (monohull, size, sail), offers freedom for the individual enthusiast to develop innovative designs; and its small size means that competitive boats can cost less than some of the larger, more conventional club racing boats.

One thing that the Moth rules allow is the use of lifting hydrofoils, and over recent years various experiments have met with increasing success. This summer the meeting at Weymouth, which included the British and European championships, saw foiled boats place 1st, 2nd, 3rd, & 5th. After such an achievement, hydrofoil boats can hardly be dismissed as eccentric novelties, and it demonstrates the worth of development classes.

Michael Billinge
Ballymacoda, Ireland

Comments on Comments from Charles Magnan

In reply to various comments made in the last edition of Catalyst I would like to make the following points:

1. As the main idea of the original Catalyst article was as a discussion document, it certainly appears to have succeeded, as I understand that the comments printed were a small selection of the responses received.

2. I would like to draw a distinction between the first part of the article which suggested the basic concept with questions raised as to whether rig parameters such as sail area, use of kites and wing masts/sails should be restricted and if so, by what means, and the second part which dealt with the interim solution in which AYRS has donated a trophy to be contested at Worthing Yacht Club in Sussex, on the English Channel coast.

The former was intended as a discussion document, with the hope of generating enough interest to get an international challenge trophy competition somewhat similar to the Little America's Cup, but addressing some of the problems associated with it, started in the near future. The latter was intended to start the ball rolling in a more modest way, a "quick and dirty" solution to try the idea out and to show that we (AYRS) were doing something more than just talk about it.

Of necessity, the "quick and dirty" approach means a "keep it simple" approach and so all the moot points described above regarding what/how to restrict rigs etc. have been left as unrestricted except LOA and an overall caveat allowing the race officer of the host club to bar any craft deemed in his/her view to be unsafe.

3. Regarding Michael Collis' comment that we should allow 6.5 metres and to "go modern" i.e. adopt metric measurements - As an engineer I fully support the use of metric units, and am amazed that industrialised countries still use archaic and inconsistent units for engineering purposes. The idea started as a simple reduction in size from C to B class which has a restriction of 20 foot LOA as well as sail area restrictions, but with a removal of the requirement to be a catamaran. 20 Foot LOA is also the de facto maximum size of typical production racing beach cats (e. g. Tornado) which provides a useful bench mark for comparison with experimental craft beloved of the AYRS. The trophy rule itself actually defines maximum LOA as 6.1 metres, which is a few mm tolerance over 20 feet. I would have liked 6m maximum LOA, but this would eliminate existing 20 footers including many of the host club's boats. I contrast the idea of increasing LOA to 6.5m with Dave Culp's suggestion (unpublished in Catalyst), made when the Committee discussed the idea initially, that LOA should be reduced to 16 ft or thereabouts in order to keep costs from spiralling.

4. Regarding Robert Biegler and Greame Vanners' comments that we should restrict sail area instead of LOA, whatever you restrict is going to produce distortions of some kind and if we are to be as wide ranging as possible, how do you have kites, autogyros, hard and soft sails with or without wings etc measured consistently? (Do you measure the blade area or the swept circle area for an autogyro?) This is a difficult one, as I personally would like to see some form of restriction, though in addition to LOA. if you want to keep costs sensible without resorting to incredibly complicated restrictions (see America's Cup, which achieved the latter, but not the former) then LOA is by far the simplest and most effective way of restricting the overall size (however defined) and cost.

In the single-handed transatlantic race, size was originally restricted only by the ability of the single crew, resulting in Alain Colas' 234 foot boat (ship? - about the same as a 19th century clipper) in 1976, after which LOA categories were introduced.

For the simple initial competition, sail restriction was left to the English Channel, where the choice of an open unprotected coast for the venue effectively eliminates craft that are too lightly built or over rigged, as even the locals cannot predict weather or sea conditions much in advance.

My preference for an international competition would be for some form of fairly generous sail restriction to eliminate rigs that are too extreme as well as a length restriction. The modern Tornado rig now exceeds the area allowed by the B class for which it was originally designed. I would also like to see solid unstowable wing masts/sails restricted either in area, or otherwise forced to be able to demonstrate the ability to weathercock so as to feather into the wind whatever its direction, i.e. having unrestricted 360 degree rotation. This forces rigs to have a degree of practicality.

Regards,
Charles Magnan

Coincidentally with Michael Billinge's letter came the following from the Weymouth Speedweek organisers.

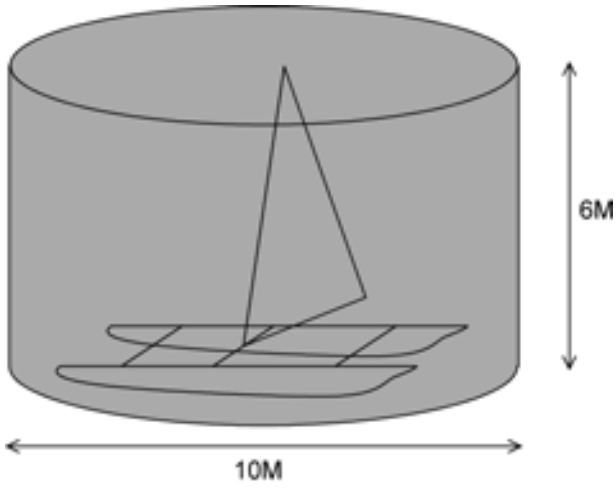
Weymouth 10-6 – A new Weymouth Speed Week boat class for 2005

The Weymouth 10-6 class has arisen from a desire to introduce a design formula that will lead to 'affordable' speed sailing craft that can be built, stored, transported and campaigned on a reasonable budget. The class is open to all. It will make an ideal student project. A prize will be offered for the fastest Weymouth 10-6 sailing craft each year.

The rule is deliberately simple and non prescriptive. It is:

The sailing craft, in all operational configurations, must fit within a cylinder of ten metres diameter and six metres height. No appendages, either above or below the static waterline may extend outside this defining cylinder at any time when in operation.

For measurement purposes the craft must be positioned such that its static waterline is on a horizontal plane, the static waterline being defined as that achieved by the craft at rest, in operational configuration and loaded with its normal complement of crew in their normal positions.



PROA CREW WANTED

I am bringing my 7.5m proa over to Europe next summer to compete in all the distance races we can. Carnac, Bol'dOr, Centomiglia, Texel, Round the Island, Fast Cat, Weymouth Speed Week, and whatever others we can fit in between times.

I will be based in Emsworth, so will be racing locally when not travelling. The purpose of the trip is to have fun, meet some people and spread the word in a low-key way about proas. I would not be averse to selling some boats as a result, but this is very much a secondary reason for the trip.

I am looking for crew for all the above races. The ideal is someone who will pick the boat, trailer and me up from Southampton dock, and drive us to the races, which they have previously entered, organised and done all the homework on. At the other end of the scale, and probably more realistic, I would hire/buy a van with a tow ball and meet the crew at the venue. Different crew for each regatta, and indeed each race, would be great.

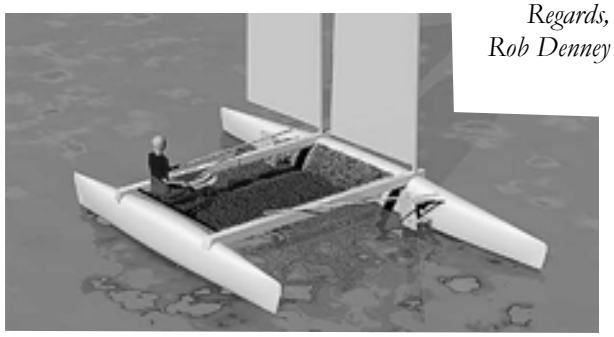
For information on the boat, see *http://www.harryproa.com/Elementarry.htm, http://www.harryproa.com/Elementarry/BuildingPhotos_3.htm* and *.../Elementarry/BuildingPhotos_1.htm.*

We are currently building a new mast, and will be sailing again soon, hopefully getting some more edifying photos.

I would like to reach as many potential crew as possible.

I am also looking for information on races, but most web pages are still talking about 2004. Any suggestions on where to find a comprehensive list would also be appreciated.

Regards,
Rob Denney



OutLeader™ Kites

Dave Culp, KiteShip Inc

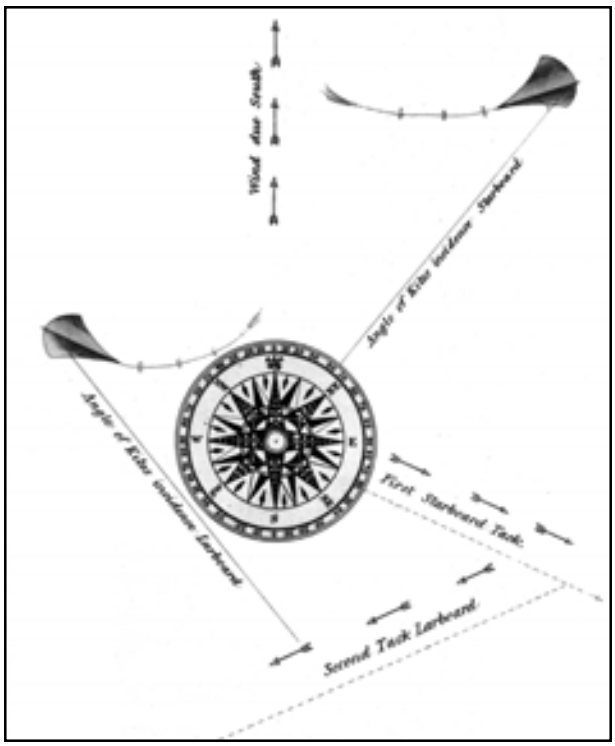
OutLeader spinnaker replacement kites are being built and sold in sizes as large as 500 sq meters, an order of magnitude larger than any previous waterborne traction kites. In order to realize this, KiteShip needed to overcome significant technological hurdles while retaining as much of kite sailing's theoretical advantages as possible. With its roots in long-term amateur R&D, the company has sold several dozen kites for yachting and offshore use, all over the world. OutLeader kites, developed for the 2003 America's Cup, are rule-legal spinnakers under all racing classes based on ISAF rules and definitions.

History

For at least 250 years western man has experimented with using large kites to pull vessels and vehicles. The solitary engineering drawing in George Pocock's 1827 Aeropleustic Art clearly demonstrates the physics of kite sailing upwind. There is good evidence that Chinese and Indonesian kite sailors applied their skills centuries earlier yet.

Goals & potential

There are compelling potentials to kite sailing, and also fairly profound limitations. The ability to design and sail a craft with no heeling moment is a marvelous concept. No heeling means no need for ballast, no need for beam, no second/third hull for high speed and sail carrying ability. Considering longitudinal heeling moments as well, kite powered craft do not bury their bows when pressed hard, thus do not broach, spin out or under extreme conditions, pitchpole. All of a kite's rigging forces are delivered via one or a few simple lines; the total pull of which are a fraction of the tensile stresses required to hold up a conventional rig. Lower forces mean far smaller strains on the boat's structure, which means less weight, less cost, and more potential speed. Kites harvest wind energy above the surface. This means they operate above most surface turbulence, and in higher average wind speeds than do surface sails. Perhaps surprisingly, very little altitude is needed to



This is taken from George Pocock's 1827 edition of "Aeropleustic Art;" It clearly depicts the technique for kite sailing to windward.

find sufficient advantage to best conventional sails. Kites can be and inexpensively added to almost any vehicular structure, due to the first two attributes above. Thus kites can be profitably fitted to existing sailboats, power boats and even to unpowered marine structures, such as barges, oil rigs and even icebergs.

Limitations

Limitations to kite traction principally include low/zero wind flying, plus launch and recovery issues. Unlike a sail, kites have a minimum windspeed, or stall speed, below which they cannot fly. There are solutions and work-arounds, but this is a fundamental aerodynamic limit sails do not share. Only the introduction of lighter-than-air (LTA) kites can eliminate this disparity completely, though skillful dynamic flying can lower the limit artificially. To date, only one kite system has demonstrated practical launch and recovery methods for large scale kites, and those are heavier than air—imagine dealing with hundreds of feet of rigid wing elements or thousands of cubic feet of helium-filled structure on the foredeck of a boat in heavy wind and sea states.

In addition, control of kites in flight is fundamentally more complex than control of ordinary sails. Kites are free-flying structures, so require both 3 dimensional stability and also 3 dimensional control. Commercial studies done 20 years ago concluded that kite control was too labor intensive, too tiring, and beyond then-available computer control. This is not the case today, but manpower and skill level issues persist.

The very efficiency of kites work against their application to large sizes. An efficient kite, capable of pulling a boat on all courses of sail, is typically capable of flying at 3-4 times the true wind speed. Unlike efficient sails, decoupled kites are free to accelerate, separate from the hull. While this is a decided advantage for area-limited racing classes, it is a disadvantage for large kite installations. A kite capable of varying its apparent windspeed by a factor of 4 will vary its tensile force by a factor of 16. This results in a designer's quandary; do we design for minimum force and suffer almost constant over-powering, or do we design for maximum force and suffer almost constant under-powering? With such a large Min/Max pull ratio, even designing for middle ground marginally useful—one gets the worst of both extremes.

It is possible to ameliorate the above with careful and precise control of the kite—essentially flying it at a near-constant speed. This requires a very high level of skill however, and likely sophisticated—and expensive—computerized controls, which effectively limits it to the largest sizes in order to realize cost-effectiveness.

How much of "ultimate" goal is possible?

It would be beneficial for kitesailing kites to retain all 4 of the above goals—non-heeling, low hull stress, fly in stronger undisturbed air than other sails, and retain inexpensive retro fitting, all while retaining the ability to sail on any course ordinary sails can fetch. All the above while simultaneously minimizing the limitations; stall speed, auto stability, launch/recovery and Min/Max-pull detriments.

State of the art

Most previous attempts to use kites have walked this line—simultaneous attempts to maximize all positive and minimize all negatives, in the same

structure. There are a number of current projects seeking to put kites on boats. Peter Lynn is offering a 3 meter 4-rudder catamaran and kite for personal use. Naish Kites has built both an experimental 50 sq meter and even a 100 sq meter leading edge inflatable (LEI) kite for boats from 30 to 50 feet in length. Sky-Sails in Hamburg is experimenting with radio-control air-filled kites for pulling scale model commercial ships. The Windjet Project is using off-shelf kitesurf kites as first-generation approach to pulling their vehicle—to be followed by rigid or semi-rigid, higher efficiency kites. In addition, dozens-to-hundreds of small catamaran sailors are experimenting with converting kitesurf kites for small boat usage.

OutLeader project

In Spring of 2001 the firm of BMW Oracle Racing (then Oracle Racing) approached KiteShip under a non-disclosure agreement in order to determine whether a rule-legal spinnaker could be designed and built which was also a free-flying kite. They understood the potential for stronger winds aloft, and also wanted to explore an IACC rules loophole that the first boat to extend its sailing rig past a finish line would win the race. BMWO's thinking was that such a kite could not be built, but they wanted to explore the concept sufficiently to assure themselves that nobody else would surprise them on the race course.

A rule-legal spinnaker must consist of a single layer of cloth, without battens, inflated chambers, spars, foam or any other rigid or semi-rigid materials. Further, a spinnaker must be three-cornered and must be flown from no more than 3 lines, each of which must lead directly to one of the corners of the sail. The sail must not have any discontinuities (such as flares or keels), or multipart bridles. At the same time, in order to be a successful racing sail, such a kite must be more powerful than existing spinnakers on all courses spinnakers may fetch, despite a century and a half of development on the latter. The kite must be able to be launched and recovered by a racing crew in close quarters, unassisted, and finally, the kite was required to be able to be flown from the yacht's existing winches, turning blocks and deck hardware, due to cost and time limitations.

Complete secrecy was required; KiteShip agreed to keep strict secrecy through March of 2003 in exchange for sole ownership of any intellectual property created. We were compelled to do all our R&D in remote desert areas or offshore far enough to hide the kite entirely. The worldwide kite design field is quite small; our employees held close personal and professional relationships with the best European and New Zealand traction kite designers. In order to "hide in plain sight" we announced—secretly—that we were working on a US Government project relating to fishboat propulsion via kites. By requesting that the "leaks" hold our project in strictest confidence, we felt assured it would receive the widest circulation—which it did. Ironically, a near-leak to a real competitor would have all but assured the use of kites in the actual 2003 America's Cup. Late in the preparation for racing, BMWO became convinced that the New Zealand Defenders had abandoned their kite project; which turned out to be true as their top designer became convinced that KiteShip wasn't working on kites for the Cup—which was untrue.

One-trick pony

No kites existed which would fill all of BMWO's requirements, or even most of them. KiteShip thought the design brief was possible, but that the best kite we might build would likely be a "one trick pony;" a kite with a very narrow range of advantageous courses, be expensive to produce, extremely labor intensive to fly, and would likely only benefit top level professional sailing crews and boats. However, we jumped at the opportunity to develop such a device on someone else's budget and for such a prestigious race.

6 weeks of work on the project resulted in a workable kite

which was rule-legal, but was only marginally maneuverable and not powerful enough to beat an identical boat with a same-sized spinnaker. An additional 3 weeks brought us a kite which was fully maneuverable and far more powerful than equal sized spinnakers. The client was skeptical, based on the earlier partial success, so we embarked on a longer term development project to build ever-larger OutLeader kites to further demonstrate their abilities.

In two-boat testing in May of 2002 off the California coast, OutLeader kites consistently beat an identical sistership carrying an 89 meter asymmetrical spinnaker verses the 69 meter OutLeader. However by this time BMWO had run out of time for "revolutionary" technology and sunsetted the project for the 2003 AC.

During the 2-boat testing, as we were developing techniques to launch, control and recover the kite, it occurred to KiteShip's principal designers that the OutLeader kite had not just fulfilled the BMWO requirements, we had serendipitously surpassed our "one trick pony" expectations. The final kite actually had a far greater range of both wind directions and also wind speeds than conventional spinnakers. The kite was simple to control at sea, typically taking only 2 sailors to drive it. Because of the requirements to be a legal spinnaker and to be flown from a yacht's existing equipment, we had in fact created a device fundamentally no more expensive to produce and to repair than standard spinnakers, and which could be brought aboard and flown from any yacht with truly minimal alterations to the boat. It was literally a "solution in a bag;" the device could offer significant performance advances at a small fraction of the cost other solutions.

Specifics

KiteShip's OutLeader kite is a highly tailored free-flying sail (kite) built of multiple gores of ordinary woven spinnaker cloth. The kites have no rigid parts, no battens, no inflatable chambers, no ram air rigidity. They have only 3 lines, leading to each of 3 corners of the kite (plus a launch/retrieval line, lead to an interior reinforcing patch). Each edge has a simple cloth tabling, with leech line inside. Corner reinforcing is similar to any spinnaker's. The shape of the kite is non-discontinuous (there are no "tee" joints or bits of cloth sewn onto the sail's surface). It has no bridle lines, clubs or spars. It has no holes in its structure, other than for the attachment of lines. The kite's proportions, particularly its mid-girth/foot ratio, falls within those of any "normal" spinnaker. Indeed, the kite was developed to be defined as a "spinnaker" under both ISAF Racing Rules of Sailing (RRS) and the 2003 IACC version 4 rule. The kite's structure, shape and aerodynamic capabilities are the subject of US and worldwide patent applications.

KiteShip is often asked what the kite would "look like" if it did not need to conform to racing rules. Our answer used to be along the lines of the benefits of restraining technological advances fairly near the paradigms of sailors, thus the "spinnaker-like" look and feel was an advantage, as is the ultimate retail cost, which is much nearer a sail's cost than to that of such kite-like structures as hang gliders, sport parachutes or even kitesurf kites. Our early adopter user feedback and early run production kites have altered our perceptions slightly. (KiteShip has sold and shipped several dozen commercial OutLeader kites at this writing)

Given a clean slate and a free designer's hand, by and large, OutLeader kites would look very much as they do now. In designing the kite to conform to racing rules, we were forced to innovate in several ways which were ultimately beneficial—some uniquely beneficial—to any sailboat's use of the device. Because we were restricted to 3 flying lines and no bridle or bridle systems, the kite is easy to launch and recover aboard the foredeck of both small and very large boats. Because the kite could not contain any inflation or artificial rigidity schemes, it remains easy to manhandle into and out of launching bags, onto and off the foredeck and in the air, even in very large sizes. Because we were forced to "limit" control of the racing kite to the boat's existing sheet winches and "hard point" mounting locations, we developed a sail which can be carried aboard nearly any yacht, can be set up in 15 minutes, and fly to advantage without additional cost of custom equipment, specialized winches or alterations to the boat.

Because of engineering limitations, our control of aerodynamic shape results in a wing of only about 2–2.5:1 lift over drag. This is similar to conventional spinnakers—and superior to many. In controlled experiments we have flown OutLeader kites to within 45 degrees of apparent wind; typical user boats have little difficulty sailing at 90 degrees and often 70 degrees apparent. This is significantly closer-winded than most spinnakers.

However, these limitations resulted in a device not suitable for upwind sailing; OutLeader kites are downwind and crosswind kites only, like any spinnaker. Again, however, what we initially perceived as a limitation has advantages as well. An efficient kite, one capable of sailing close enough to wind to allow upwind sailing, must have a L/D in excess of 4, and preferably on the order of 6-8. Kites of this level of efficiency are easily able to accelerate to speeds several multiples of the true wind speed. When a kite flies at multiples of the true wind speed, it typically experiences apparent wind speeds of similar multiples. As power from the wind varies with the square of apparent wind speed, this means that efficient kites experience a huge differential in power as they fly. Peter Lynn coined this variability the kite's MMR, or Min-Max Ratio of power, in 1993 (see "Buggies, Boats and Peels" in Ultimate Sailing II, AYRS Publication 116). A kite capable of flying at 4 times wind speed may exhibit a MMR as high as 16; meaning that its maximum pull can be 16 times its minimum pull, depending only on the kite's speed through the air.

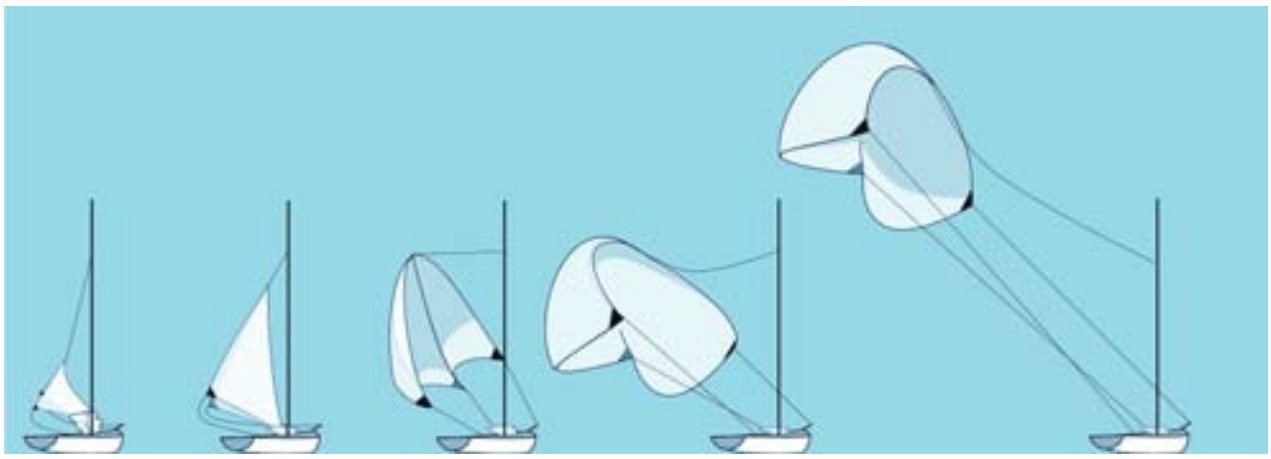
It is difficult to design a structure for this level of variability, unless it is relatively very small. (A kite-surfer, for instance, can either "bleed off" large power surges by bearing away quickly, or accept the consequences and fly up into the air—sometimes to incredible heights and distances—when over-powered. A yacht can develop many multiples more side force than a board, and cannot be instantaneously run off to leeward at high speed any time the situation demands). Designing large kites and controls for high MMR kites is a challenge: does one design for the lowest expected power and suffer over-power most of the time, or does one design for max power, leaving the yacht under-powered most of the time? For MMRs above about 6, even designing for the mid range is of questionable value; leaving the yacht alternatively under- and over-powered, with the same kite in constant wind.

The ultimate solution to this is higher sensitivity in the kites' control. If the sailor can affirmatively control the high L/D kite's acceleration at all times, he can "dial in" the amount of power wanted—or able to be absorbed—by the yacht. There are some smaller kites exhibiting this level of control, so long as they are hand-held by skilled fliers whose attention does not wander. Large high L/D kite control likely awaits precise computer controls, with real-time feedback of the kite's position, velocity and line tension.

Because OutLeader kites are limited in their L/D, they are unable to accelerate to speeds greater than approximately 1.5—2 times true wind speed. Their MMR therefore is limited to the range of 2—4, which is well within the ability of most existing boats' equipment and structures to absorb. Even at very large sizes, there is limited drama to sailing them. We do not envision giant yachts "getting air" as they power up their OutLeader kites!

The downside to this is that, similar to other spinnaker sails, OutLeaders are not useful aboard yachts when sailing faster than about 1.5 to 2 times true wind speed. From the sailor's point of view, the apparent wind draws too far forward to keep the spinnaker—or OutLeader kite—filled with wind.

On the other hand, because it is a kite and can take its entire pulling force to the deck of the boat rather than up the mast, extremely powerful kites tend not to contribute to pitch or yaw tendencies in high winds or at high boat speeds, as conventional spinnakers do. "Over-powered" kite driven boats tend to sail bow-up, not bow-down, and their helm



balance can be closely controlled—even under way—leading to good high speed, high power control of the yacht, as opposed to the typical "edge of disaster" experience of flying large spinnakers in big wind.

Handling a kite spinnaker

Launch/retrieval

Launching and retrieving the kite are in some ways easier than any spinnaker, and in some ways more difficult. Overall, launching is similar; the bag is placed on the foredeck and all (4) lines attached. The wingtip lines run similarly to a spin's sheet and guy; the kite's tail line somewhat like a second sheet, and the launch/retrieval line goes up the mast. As all 4 lines are very long and thin, this launch/retrieval line (often conveniently—but mistakenly—called the "halyard") typically leads through a block taken up the mast on a jib or spinnaker halyard, then through a turning block and back to the cockpit.

Similarly, the 3 flying lines run through turning blocks and back to the cockpit winches. For balance, stability and gibing purposes, we typically lead the lines as follows:

The wingtip lines leave the yacht approximately at the chainplates. Often from blocks attached to the chainplates, but just as often taken to the jib or genoa cars, adjusted to be near the chainplates, fore and aft. The kite is launched with the wind on the quarter, so one line is led forward of all headstays; the other directly to the kite. These lines can lead inside the shrouds, but the lifelines want to be thought out. On a multihulls, often these lines are taken to midway out the forward crossbeam, or to bridles attached to this forbeam.

The tail line is usually lead to a turning block just forward of the headstay and sometimes right at the bow, or even on the bowsprit, if any. During all sailing and gibing, this turning block need not be adjusted.

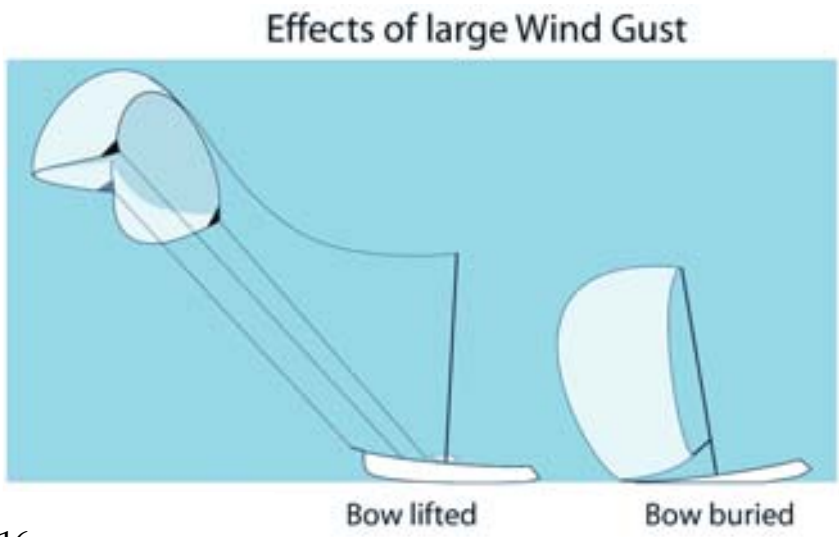
The launch/retrieval line leads up the mast, typically 3/4 of the way to the masthead. This is best lead above the jibstay top, but with masthead rigs one can use either a spin halyard or jib halyard; the misrouting is minor.

Launching with a drawing mainsail is a challenge, especially for new fliers, so we highly recommend training without the main at all. More about this under "challenges" below.

To launch the kite, the tail line is made fast, limiting the kite's tail to perhaps 4- 6' above the deck. The wingtip lines are slack, though we typically "sneak" 3' or so of the wingtips out of the sail bag to avoid twisting of the kite as it fills. The kite is pulled up the mast via the launch/retrieval line until it is suspended between this point and the tail line. The wing tips are left to stream off to leeward. In this state the kite cannot fill, and may safely be left here, lines re-routed or even re-stowed in its bag. There is no "Oh gosh!" moment as with spins, where the sail either pops full of wind or, er, doesn't. Throughout the launch—and retrieval—of OutLeader kites, the entire procedure is reversible at all times.

Once the crew is satisfied with the kite at this stage, the wingtip lines are trimmed, sufficiently for the tips to fill and the kite to stop flogging. At this point both the launch/retrieval line and the tail line are eased, and the kite takes shape. The tail line trimmer needs to ease sufficiently for the kite to fly forward/up, at which point the halyard goes slack and the kite is flying—on lines as short as 15—20'. From this point on, the launch/retrieval line is kept slack.

The kite lines may now be lengthened, moving the kite up and out into stronger, cleaner air. So long as the course is nearly dirctly downwind, the flying lines will lead fair. As the course is heated up (brought closer to the wind) two things happen; the kite must be "rolled" up on its side,



so that the increasingly forward apparent wind approaches it from its nose, and not from one side, and the windward wingtip line will begin to bear against the forestay. This latter can be alleviated by attaching a snatch block or "tweaker" line to it and pulling it forward, even down to the bow or bowsprit as necessary. The kite benefits from having its flying lines separated where they attach to the boat, in an amount equal to half to one wingspan. In rough seas, motion of the boat can cause unwanted inputs into the kite, whereupon it's a good idea to reduce the distance between lines with tweakers or similar.

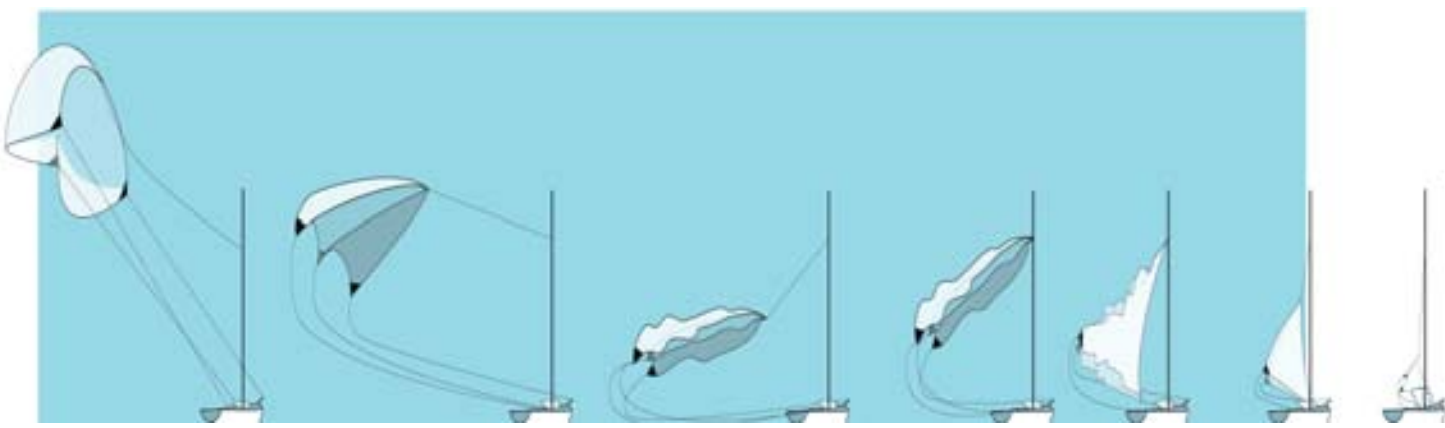
Gybing

Gybing a boat with OutLeader kite is very simple. The helm is put over and the kite is turned onto the new tack. Typically, this involves little movement of the kite and goes quite easily. The kite is completely powered up during the maneuver, unlike normal and asymmetric spins, so the boat does not lose speed, and often speeds up, as the kite is diving from one tack to the other. If used, the windward tweaker is eased or blown, and as time allows, is repositioned on the new windward wing tip line. If the boat is very fast (multihull or planing hull) it is possible to over run the kite during a gybe. In this case the gybe is carried out very quickly while the kite deflates and begins to settle. The kite will quickly fill on the new tack, so long as its trimmers have realigned it with the new apparent wind.

Once the crew gains expertise at sailing the boat under bare kite, the mainsail can be added back. It is easiest to launch behind the main if either its halyard is started (or the sail reefed), or sheeted dead flat, on a direct-downwind course. In either case, we're seeking to minimize or eliminate the turbulent wake from the mainsail, until the kite can be eased to a point it is flying above the main's wake. A bit of practice can lead to a procedure where the kite is hoisted behind the drawing main, then fairly quickly, the main is sheeted in, depowering it, the kite is filled and eased, and the main sheeted back out, to regain speed. Note that from the time the kite first fills, before it is away from the boat, it is pulling as hard as any spinnaker.

Greater expertise will allow the crew to launch and fill the kite behind—actually just in front of—the drawing mainsail. It is necessary to keep the kite just forward of the main's wake, usually done on a broad reach. It has been quite necessary for even skilled crews to go through this sequence of training moves; many skilled sailors have wasted time and even races in attempts to move directly to expert handling.

It is useful for a single trimmer to control both wingtip lines, though he can use assistance in keeping the winches clear of over rides. If two trimmers are used, it is helpful to lead their lines to adjacent winches on the same side of the cockpit, so they are in close verbal—and visual—communication. KiteShip has found that, once the kite is drawing and stable, it is often possible to cleat the flying lines and run under autopilot for extended periods. Short handed users have found it possible, fairly easily, to launch and fly double handed with an autopilot, and with some difficulty, double handed with no autopilot. A few users report success single handing their boats with OutLeader kites, with autopilots. We did not think this possible when developing the kite. However, for instance, when conventional sailing calls for trimming on one line, a kite does not care if the crew eases the opposite line, with the same result. Thus, until one runs out of line tails, the kite can be fully controlled for extended periods without grinding any winches. Alternatively, lines may be eased when time is tight, then winched back in when



the crew is less busy. Put another way, racing crews can "time shift" the grinders' loads, as during gybing duels.

Retrieval

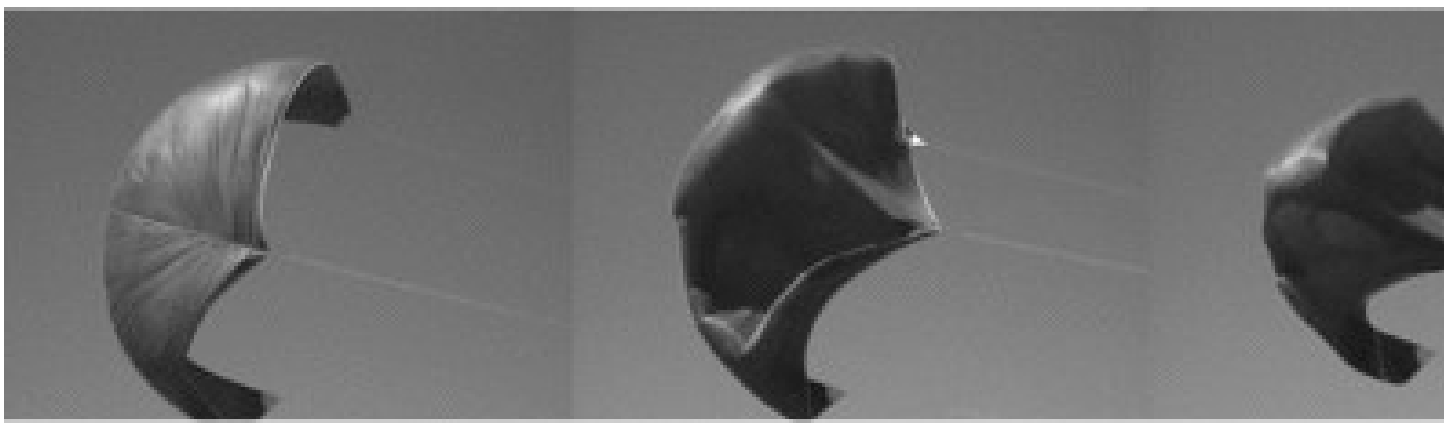
Retrieval of the kite is similarly straightforward. Typically, the launch/retrieval line is made taut; all other lines are blown (quickly released), bringing all tension onto the launch/retrieval line. The kite instantly folds up, like an umbrella, and can be retrieved to the mast head. If done even fairly quickly, the kite never gets wet, even from far away from the boat. It is helpful if the trimmers retrieve their lines in parallel to keep them from under the boat, and, if they apply just a little tension, the kite can regain partial shape and "float" in, from infinite distances away. At any time during this retrieval method, the flying lines can be made taut, the retrieval line slacked, and the kite will fill and continue flying as normal. Try this with a "tripped" spinnaker! In extremis—winch jambed, line broken or man overboard; it is possible to blow all of the kite's lines except one—any one—and it will similarly collapse and lay down on the water, However, retrieving via any line other than the launch/retrieval line means the kite cannot be self-relaunched without bringing it aboard first. We have personal experience at successful, no-drama retrievals in this manner, even during 40 kt squalls, from around propellers and keels and between the hulls of countless multihulls. We've yet to tear a kite, let alone lose one. When retrieved from any one line (including the launch/retrieval line) the kite does not entrain water, so retrievals from on or even underwater are again without drama.

Strengths

Kites' traditional strengths; increased airflow at altitude, anti-heeling via leading sailing loads to the deck and increased power via "working" the kite, flying in a zig-zag pattern are each evident with OutLeader kites. The strong, upwards pull is useful not only for sailing faster, but the upwards pull brings planing hulls up on plane sooner—and keeps them there longer. Strategic "working" of the kite is arduous and mistakes are costly—if the kite goes into the water—but such movements patently aren't "pumping" as little—as little as zero—crew energy is imparted to the kite. We are learning from our customers that perhaps the greatest advantage of the kites is to be had at high speed, where the kite does not bury the bows or cause the boat to broach or spin out. On high speed boats and multihulls especially, high speed "coffin corners' can be completely avoided. This is a situation where the boat is moving at high speed deep downwind. Sudden deceleration, as when attempting to round up or when a bow is stuffed, will dramatically increase apparent wind speed and also bring it aft suddenly. Such moves often result in a pitchpole capsize (multihulls) or high speed "round down" broach (monohull), sometimes resulting in dismasting, injury and even sinking. OutLeader kites do not contribute to this; if power or speed become uncomfortable, the kite may be 100% depowered at any distance from the boat, leaving it streaming off in the wind. Recovery of the kite is straightforward, even in extreme conditions.

Challenges

There are several challenges; offered from toughest to easiest:



Low wind. Kites are flying structures and like any aeroplane, have stall speeds. OutLeaders' minimum flying wind is about 4-5 knots (less with skilled flying, more without). On downwind courses one must subtract the boat;s own speed from true wind, resulting in a need for 7-10 kts of true wind in order to launch the kite (again, much constrained by crew expertise). Launching in too light wind often results in frustration, delay and wet kites. In light winds, then, it is advantageous to fly conventional spinnakers.

Kite in the water. A severe bugaboo for spinnakers, dunking an OutLeader is no big thing. Our original design brief required both the ability to successfully "shrimp" or "prawn" the kite and to re-boat it even if completely immersed. In the end, it is often possible to relaunch the kite, from completely immersed, without touching it or bringing it aboard the boat.

Lines fouling other boats. This is primarily a perception issue. When close sailing is expected, the kite can be flown on lines as short as 15-20', resulting in the kite's flying nearly as close to the boat as a conventional spinnaker. Alternatively, the kite is a maneuverable device; it can be flown up and over the rig of a boat to leeward unless very close. If worse comes to worst, the kite can be "tripped" and quickly retrieved, even from very close quarters. Kite flying skippers will need to show good judgment, and decide early whether they can safely clear or take their chances and suffer penalties for touching. Nearing marks, it is possible to winch the kite in close and douse like any spinnaker, or one can douse farther from the mark, continuing in on main and jib. It is apparent that, when they can be profitably flown, kites offer enough speed advantage to overcome small losses.

Launching behind the mainsail. During launch, any spinnaker must be kept away from the mainsail's wake, or vortex. Using a pole or bowsprit-mounted conventional spinnaker obviates this for the most part, but kites are free to fly where they will—including into this wake. It is a challenge, then, to launch the kite and get it away from the boat without encountering this. We typically train crews to fly the kite first without a main at all, so that they may become proficient at simply flying the kite. Later the main is left hoisted during launch, but may be either reefed or centered on the boat, to completely depower it and eliminate the vortex while the kite is raised. Last, the crew trains with the main set and drawing, using skill to keep the kite wholly ahead of the main's wake as it is filled and moved far enough away from the boat so as not to interact with the main.

Improvements

Few inventions offer perfection. We're often asked what we'd change, if "rule legal" weren't a part of the device's make up. Could the kite be even more powerful? Could it be closer-winded? Could it replace the yacht's entire rig, and sail the boat both upwind and down effectively?

We are engineers. Our first response to almost any request is "Yes, but…" There is a strong temptation to move tangentially and address our favorite subject; kite design. However, prudence suggests that we take a look at the underlying engineering issue:

OutLeader kites were conceived, designed and are being built as replacements for spinnakers. As such they are stronger for their size, closer winded, more stable and fundamentally the same price as the sails they replace. The kite has its peculiarities and

challenges, but it fundamentally costs, launches, handles and recovers similarly to devices sailors sail with now, and offers compelling improvements at each juncture.

Can a kite replace a boat's entire rig? Yes, and likely at a lower cost—and higher performance—than the rig it replaces. However, such an alteration is major and would include not only a much increased cost for the complex kite, but also the abandonment of the boat's existing paid-for mast, boom, in-hull structural support and all running and standing rigging. Would it be superior on all courses? Not likely. Sailing has developed specialized sails for each point of sail. Asking a single sail to excel on all courses suggests it cannot excel at each. This is as true of single-sail boats as it is for single-kite boats. Can one carry a multitude of kites? Sure, but each comprises, functionally, the boat's complete rig. Carrying multiple rigs offers some interesting engineering and racing advantages, but cost considerations likely rule this out. Can one just use a giant kite surf kite and leave it at that? Possibly, however, kite surf kites are routinely launched on full length lines, either assisted from shore or laid full length on the water, then "swimmed over" to manipulate the kite into its launching configuration. Assisted launch, or long lines sitting in the water during launch sequence, let alone "swimming over" the kite during launch.

Cruising uses

We receive much mail regarding cruising uses of kites. It is alluring to consider "setting and forgetting" such a sail at the start of a cruise, then collecting it at the end. Reality doesn't necessarily follow imagination, however! Present state of the art yields kites which are no more difficult to fly than racing spinnakers, but which are probably not yet suitable for casual husband/wife cruising teams. OutLeader kites can be flown short handed, but typically by fairly athletic and skilled sailors. Casual racing with "Wednesday night" crews is well within reason, but wants more people aboard. These are early days; our customers are teaching us a great deal about how to fly these kites; often in manners much simpler than we imagined.

Power craft

KiteShip is in the process of fitting a number of powered vessels with kites; the payback period can be quite short for large and even medium sized cruisers who are spending on the order of $500 for a week's fuel for cruising. Again, current state of the art yields kites which require some skill and manpower to set and maintain, though considerably less of a "crew load" than full-on sailing rigs.

The future

The potential advantage of kites for racing yachts is too great to ignore. There are, and will continue to be, some rocky and variable starts between enthusiasts, rules makers and bystanders, but the ability to inexpensively convert any existing yacht for significantly greater power, speed, safety and comfort cannot be easily ignored. As kites come into the mainstream, yacht designers may take advantage of their relieving the yacht's forebodies buoyancy requirements in downwind sailing, and seek to optimize upwind performance only. Kites' highly concentrated, deck-level tractive forces may lead to alterations in the way designers consider rigging loads; eliminating the large shock loading at the top of the mast, as a large spinnaker collapses and reinflates may lead to newer, lighter, less expensive high tech rig design. Once kites replace sailing rigs altogether, we may see yachts built very much narrower, lighter, cheaper and faster than anything typically on the water today.

Dave Culp
dave@kiteship.com

AYRS notes that the Ocean Racing rulemakers have reacted to the development of offshore kite-spinnakers by decreeing that, insofar as races under an IRC as concerned, "sails shall be set in close proximity to the boat". Just how close is "close proximity" remains to be defined. Given that they are discussing ocean racing, you might think that 100m (say) is close proximity; however, two boat-lengths is probably more like it (but don't rely even on that!) The ban takes effect in the Northern hemisphere from 1January 2005, and in the Southern from 1 July 2005. - Editor

Downwind as fast as you like

John C. Wilson

Some of Peter Sharp's "power alternating sailing" proposals [Catalyst, No. 3 and 12], and others based on vertical axis wind turbines [for instance McGalliard, Catalyst, No. 11] are likely to get directly downwind faster than the wind, but they are difficult to analyse and so they may seem unconvincing.

Furthermore, no one seems to have stated the principle that unifies these examples. I believe the appropriate principle is that in order to get forward thrust in a wind-powered vehicle that is moving downwind faster than the wind, part or all of the propulsion mechanism must be going less than the speed of the wind, at least part of the time. Of course, it must not always be the *same* part, or else not all the time: otherwise that part will get left behind. Therefore, the mechanism has to be oscillatory in some way.

In this article, I present a conceptual vehicle using this principle. It uses square sails and in theory, it will go arbitrarily fast directly downwind. The practical limits to its speed are the usual ones: friction, air resistance, and so on.

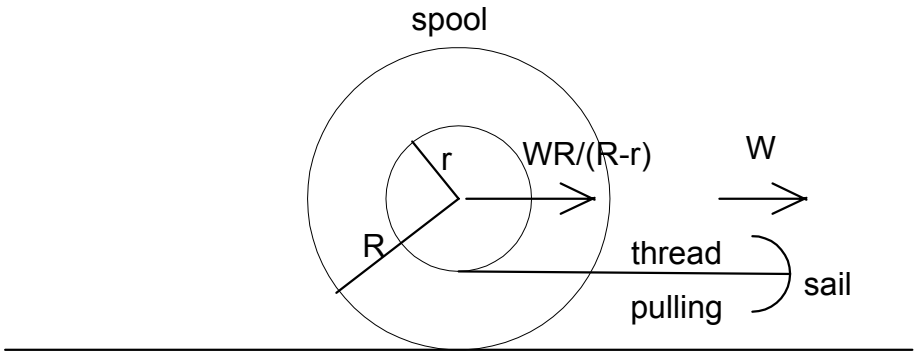


Fig. 1. Spool-of-thread analogy.

The spool-of-thread analogy.

Some correspondents have found the following analogy persuasive. Put a sail at the end of a thread which is wound on a spool (the thread must lead from the *bottom* of the spool). See Fig. 1. We will suppose for simplicity that the sail moves downwind at the speed (W) of the wind. Suppose the radii of the ends and drum of the spool are R and r, respectively. As the spool rolls downwind, the thread winds *onto* the drum and the centre of the spool moves downwind at a speed (R/(R-r))*W. By making the ratio of the two radii sufficiently close to unity, you could theoretically make the spool move arbitrarily fast. This conclusion remains true even if W is actually less that the speed of the wind.

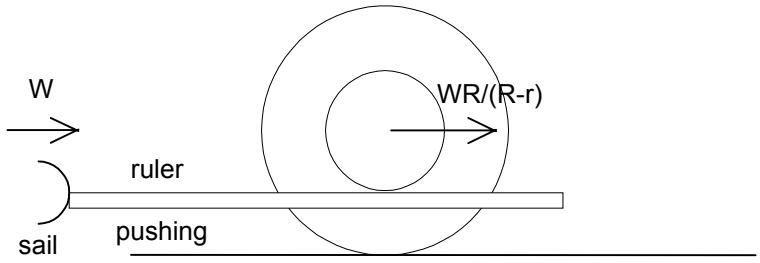


Fig. 2. Spool-and-ruler analogy.

The reason the spool rolls toward the sail is that the tension in the thread is balanced by an equal but opposite force due to friction between the rim of the wheel and the ground. These forces form a couple that results in torque causing the wheel to roll forward. As you can demonstrate by using a nearly full spool of thread, the practical limitation on the speed of the spool is slip between the wheel rim and the ground.

The reason that this doesn't solve the problem of going directly downwind faster than the wind is that eventually the spool catches up with the sail, and from then on the best you can hope for is to go downwind at the speed of the wind.

The spool-and-ruler analogy.

To avoid catching up with the sail, we could put the sail *behind* the spool and *push* on the spool. See Fig. 2. This requires something rigid like a ruler instead of a thread, but the principle is the same.

Again the speed of the spool is theoretically unlimited relative to the wind, but this time the problem is that the sail gets left behind: when the ruler runs out, the party's over.

The inchworm.

The trick is to combine these two ideas to get a vehicle that behaves like an inchworm (a caterpillar that moves on its end legs by alternately stretching out and drawing itself up in a loop). Conceptually, the mechanism consists of a spool together with two square sails (forward and aft), each attached to the end of its own ruler. The forward sail pulls until the spool catches up with it; then the aft sail pushes until it gets to the end of its ruler. While one sail is deployed the other must be retrieved to be ready for its next turn.

Here is a possible model. The pulling and pushing is done on the lower side of the drum of the spool, while retrieval is done with the top. The following is a series of diagrams showing the mechanism as it goes through its paces. In every case, the deployed sail is going at the speed of the wind (W), the centre of the spool moves at a steady speed of (R/(R-r))*W and the furled sail is being retrieved at ((R+r)/(R-r))*W. The pushing ruler is shown in black so that you can distinguish between them.

Fig. 3 shows the mechanism at the start of the pulling phase.

Fig. 4 shows the mechanism at the end of the pulling phase. The spool has caught up with the forward (pulling) sail and the aft (pushing) sail has been fully retrieved.

Fig. 5 shows the mechanism at the start of the pushing phase. The ends of the rulers have rotated around the drum. Just how this is done is left as an exercise. The pusher sail has opened and the puller sail has closed. The sails can be expected to furl and deploy automatically, according to whether the apparent wind is ahead or behind.

Fig. 6 shows the mechanism at the end of the pushing phase. The pusher has come to the end of its ruler and the puller has been fully extended ready for its turn.

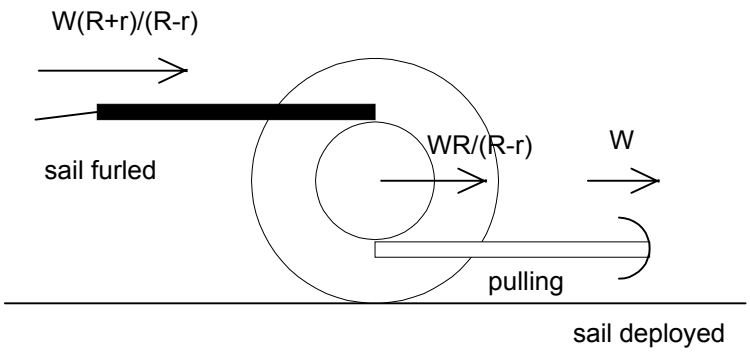


Fig. 3. Inchworm: start of pulling phase.

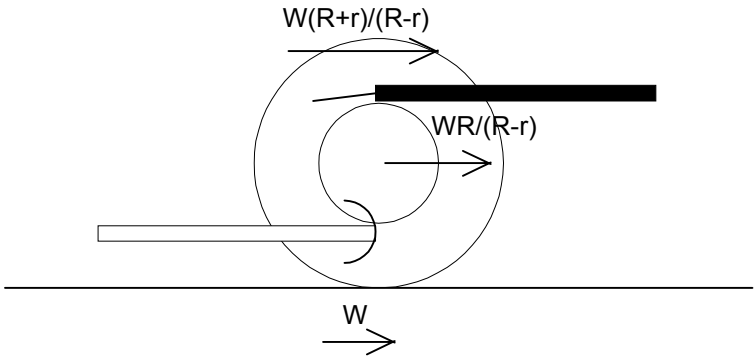


Fig. 4. Inchworm: end of pulling phase.

Now the ends of the rulers must rotate around the drum again to get in position for the pulling phase (Fig. 3).

If you watch the deployed sail, you can see the inchworm analogy: the deployed sail is like the foot that is on the ground (forward, aft, forward, aft,...). Since the sails push on the wind, not the ground, it is more like a windwalking inchworm.

Numeric examples

If R=3r, the spool moves at a constant speed of 1.5 times the windspeed, while the furled sail is retrieved at twice the windspeed.

If R=2r, the spool moves at a constant speed of twice the windspeed, while the furled sail is retrieved at three times the windspeed.

If R=1.5r, the spool moves at a constant speed of 3 times the windspeed, while the furled sail is retrieved at five times the windspeed.

Switching

I said facetiously that the detail of switching between the pulling and pushing phases was "left as an exercise", but here is a suggestion. Build each "ruler" in the form of a toothed ring with the teeth on the inside, and use a gear wheel for the drum of the spool. (See Fig. 7). The remaining "exercise" is to figure out how to get the lower teeth of each ruler to mesh when pulling or pushing, and the upper teeth to mesh when retrieving.

Climbing a moving belt

It seems to be inescapable that a vehicle that will go downwind faster than the wind would "climb" a moving belt in a windless room. If the frame of reference is attached to a belt moving at a speed W, then a vehicle moving at speed S, relative to the belt, is moving at speed S-W relative to the room. If S>W the vehicle will move up the belt, relative to the room.

This doesn't seem so unbelievable if you imagine the spool-of-thread analogy. Place the spool and sail on the belt. As the assembly is carried downbelt, the sail will fill and pull the spool toward it, upbelt, until the spool reaches the sail. Ideally, the sail won't have moved but practically, the spool will meet the sail somewhere between their original positions (relative to the belt), possibly "above" the spool's starting point relative to the room. The power for this comes from the motor driving the belt: the interaction with the still air causes extra drag.

Related ideas

There have been some other proposals related to getting downwind faster than the wind.

"PAS"

Peter A. Sharp's initial "power alternating sailing" proposal [Catalyst, Vol. 1, No. 3, p.26] satisfies the

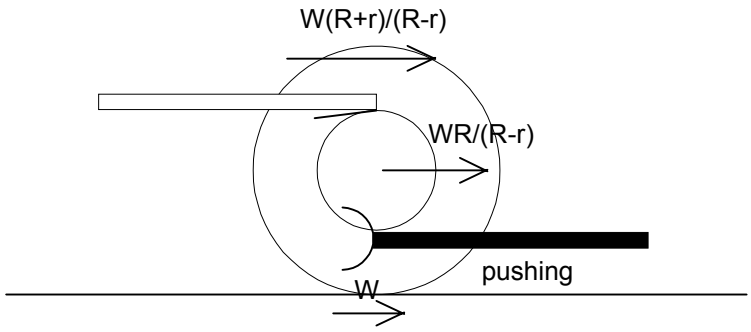


Fig. 5. Inchworm: start of pushing phase

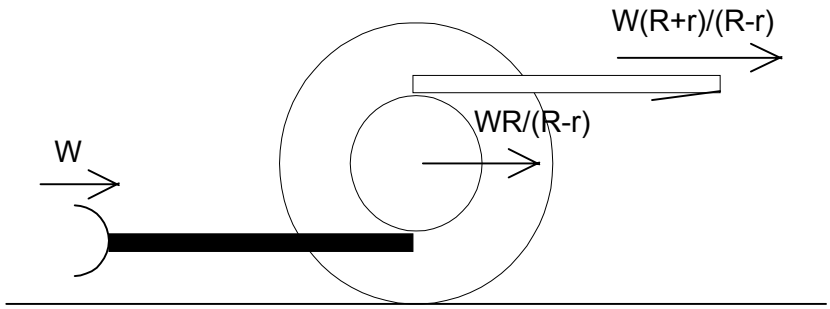


Fig. 6. Inchworm: end of pushing phase.

principle, but it seems unconvincing because it involves electricity generation and electric motors, and two vehicles that are tethered together by an electric cable. His later ones, using rubber bands for instance, are similarly difficult to analyse, but they follow the same principle.

Land/ice yacht.

A land or ice yacht alternately reaching (to build up a high speed) and running (until the speed drops) satisfies the principle. The driving mechanism (in this case, the whole vehicle) periodically spends part of its time making good a downwind speed which is less than the speed of the wind.

Turbines.

Several proposals have involved vertical axis wind turbines. These satisfy the principle if the turbine is turning rapidly enough so that some of the blades are moving downwind at less than the speed of the wind. A turbine with a horizontal transverse axis (like a paddle wheel) would satisfy the principle as well.

The "Bauer vehicle".

This is a vehicle having a propeller with a fore-and-aft axle geared to, and driven by, its wheels. If this vehicle moves downwind at a constant speed, it does **not** satisfy the principle outlined here: the mechanism that interacts with the wind, and all of its parts, move downwind at the same speed. In this case, some other principle must be involved.

John C. Wilson
johnwilson@pocketmail.com

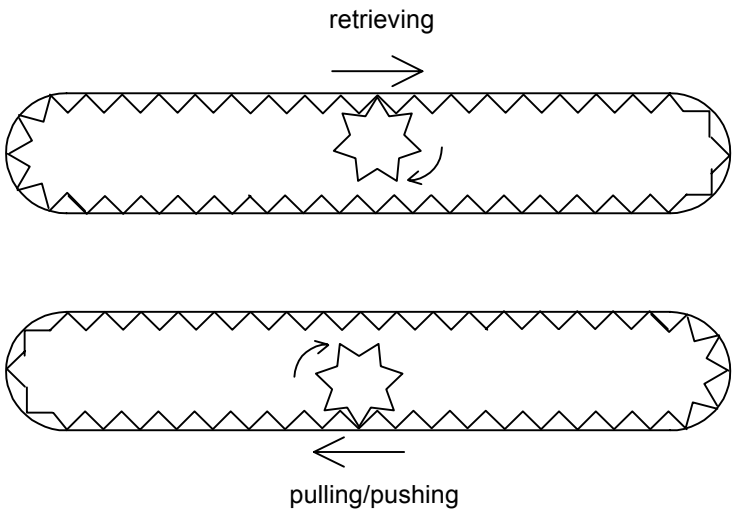


Fig. 7. Detail of drive mechanism.

Mini-Trimarans

S Newman Darby

Sailing the first Mini-Trimaran in 1948.

Note that the aftermost hull is thin and small and is also being used as a rudder. Newman took this picture in West Pittston on the Susquehanna River. This boat sailed and tacked beautifully and could break down and fit in the trunk of a car with the lid down. It was first designed to be sailed without a rudder, standing windsurfing style.

Photo S Newman Darby

This mini-trimaran was designed and built to be an all purpose fun boat, cruising sailboat and windsurfer.

I built and sailed a similar boat in 1947. It was the first boat I built to use a hand held sail to control and steer it. At that time no one in the world knew how to windsurf including me so I made a lot of mistakes. Today at 75 I could easily windsurf on it. But at first I used it as a catamaran and then converted it to a trimaran. It was another 16 years and after I built a lot of experimental boats that I taught myself how to sail a windsurfing type sailboard. Before 1964 many experts claimed windsurfing as we do it today would be impossible. Now since I have retired, I remembered the good points about this little trimaran so I built two more.

The first one I built about year 2000 was about the same size as the one I built in 1947. It was very small so it could disassemble and fit inside the trunk of a car with the lid down. But I gained weight since 1947 when I weighed only 125 pounds. I now weigh 165 pounds and some of my friends who sail it with me are over 200 pounds. So I designed and built a bigger model, the Mini-Trimaran III. This new model is just one inch under 6 feet so it will fit in the back of most mini vans or small pick-up trucks with the back door closed. It could help the many people who have a vehicle but no place to store a boat, or those who don't want to carry a boat on top of their car. A small adult can carry it on their back.

Sailing the Mini-trimaran sitting down with a cantilever mast, and steering with a rudder.

In this photo the oars are hung under the deck. Many sailing sitting like to use the oars as side railings which is often a good idea because they are rapidly accessible, and give the feeling one is not likely to slide off.

Photo S Newman Darby

Mini-Trimaran III

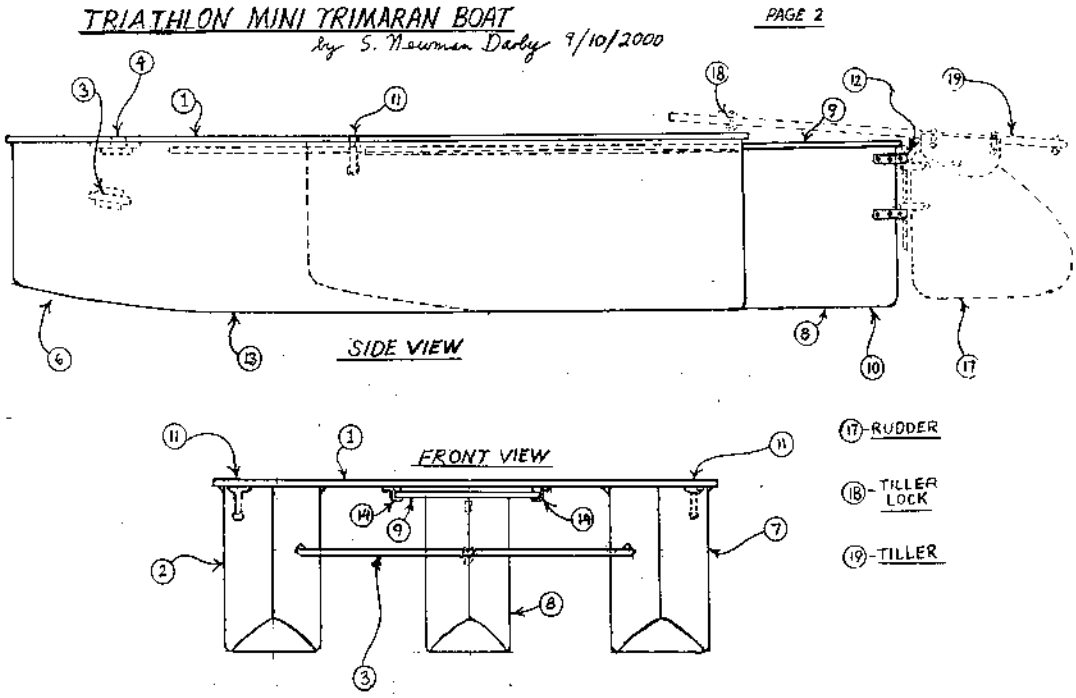
In this picture, the sailor is pushing his weight aft so as to give the flat hull bottoms an angle of attack like water skis so they will start to hydroplane. The craft has two interchangeable centre hulls. One is very buoyant for heavy sailors; the other is thin to act as a fin and not as buoyant – for lighter sailors under 180lbs. Using a shorter length will give it a greater angle of attack.

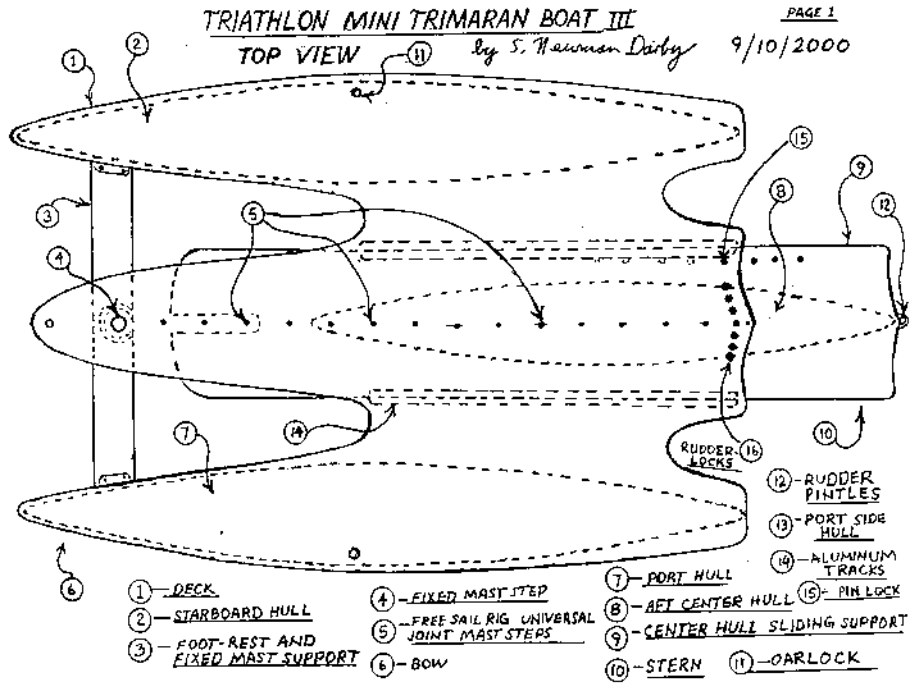
Photo S Newman Darby.

Sailing in a light wind.

The hull is set to a longer length in a light wind, and the rudder is left on straight to increase the lateral resistance. The rudder can be left off in high winds. It takes only 30 seconds to change the boat's length and lock it. This boat can tack in shallower water than most sailboats. It will tack upwind better than most sailboards and dinghies with deep hulls because it has more lateral resistance.

Photo S Newman Darby


TRIATHLON MINI TRIMARAN BOAT
by S. Newman Darby 9/10/2000
PAGE 2
SIDE VIEW
FRONT VIEW
17-RUDDER
18-TILLER LOCK
19-TILLER


TRIATHLON MINI TRIMARAN BOAT III
TOP VIEW
by S. Newman Darby 9/10/2000
PAGE 1
RUDDER LOCKS
12-RUDDER PINTLES
13-PORT SIDE HULL
14-ALUMINUM TRACKS
15-PIN LOCK
1-DECK
2-STARBOARD HULL
3-FOOT-REST AND FIXED MAST SUPPORT
4-FIXED MAST STEP
5-FREE SAIL RIG UNIVERSAL JOINT MAST STEPS
6-BOW
7-PORT HULL
8-AFT CENTER HULL
9-CENTER HULL SLIDING SUPPORT
10-STERN
11-OARLOCK

A small scale model made to test balance and buoyancy.

This model did not have a variable length, but Newman felt it was better to build the Mini-Trimaran III with variable length and now is glad he did.

The Mini-Trimaran III is made of plywood and fibreglass.

Scott Morephew mounting the windsurfing sail.

Scott just completed an 18 mile river race on a sailboard and sailed for 9 hours.

Note the oars under the deck. This boat is a cruiser.

Photo S Newman Darby.

It is an especially good design for people in Florida and the south, as, if the wind stops, you do not have to lie down and paddle with your hands in waters that have alligators, snakes, sharks, etc.. It can carry oars or kayak paddles under the deck. This mini-trimaran does not need deep keels or rudders and will tack up wind in shallow water. Because the hulls give it great lateral resistance it will tack upwind better than many sailboats with deep daggerboards and rudders. It also tacks with very small sails for beginners. It will sail off and on a beach without worrying about catching on the bottom. I build these boats for fun and hobby, but, if more than 30 people want to build one and contact me, I will draw up and print plans and instructions.

My E-mail is; newmandarby@webtv.net

Phone or fax; 904-924 0653

Address: S. Newman Darby 8024 Lorain St. Jacksonville, Fl. 32208 U.S.A.

P.S. I would be glad to help any companies if they would want to manufacture these mini-trimarans.

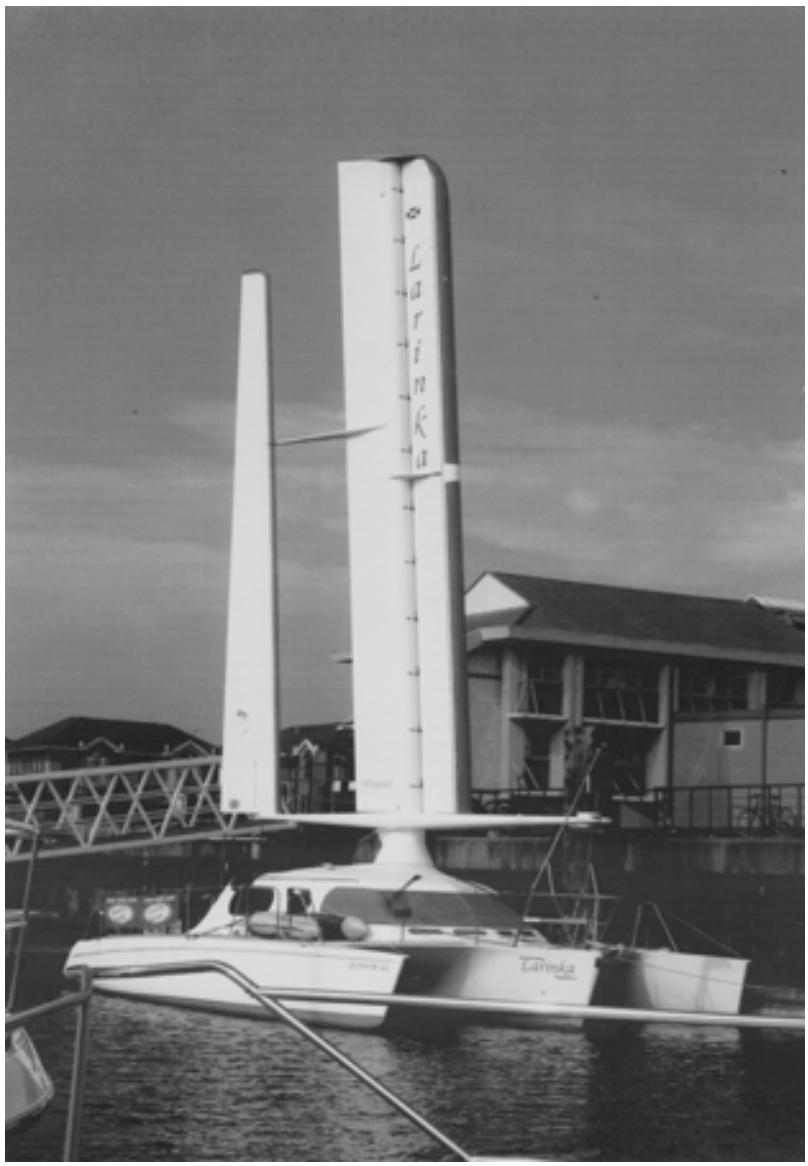
A MONOPLANE WINGSAIL CRUISING TRIMARAN

James Wright

Walker Wingsail Systems plc and Plymouth Composite Construction, companies based in the UK, designed this vessel. The former company is no longer in existence but design work continues. Aerodynamic and design academics, based at Cambridge University Engineering Department are conducting aerodynamic analysis on wingsails.

"Larinka" is powered by a unique aerofoil wingsail under fingertip control by "*Micromariner",* the onboard computer system. (The boat can also be sailed manually should system failure occur. There are back up battery systems further linked to solar power panels which constantly provide electrical power to trickle feed the batteries at any given time). Therefore both electric and manual standby alternatives are available. Additional diesel generated power is available mainly for domestic usage.

"Larinka" is no Spartan craft and boasts two en suite cabins. The boat is air-conditioned and has an independent Whisper generator fitted which complements her bridge, which mimics the Starship Enterprise! She sleeps six persons comfortably and the galley is awash with burr walnut and teak with even a bread maker and automatic memory combination cook oven added for home comforts. Separate fridge and freezer form part of the itinerary but sadly no washing machine due to weight factors being critical to her performance. Toilets are symphonic and there are radio cd players fitted fore and aft together with an inbuilt TV/video recorder for those periods on a long voyage when there is little to amuse the crew.



..

"Larinka" does not perform any better or worse than conventional craft in light winds but in winds over 15 knots she comes into her own. Not only is she impressively stable in heavy seas but also her speeds are impressive. Other sailing craft would be battening down the hatches at wind speeds over 20 knots but *"Larinka"* merely revels in such conditions and the wing technology comes into her element. The "*Micromariner***"** tacks and gybes automatically and all crew are snugly inside in the warm and are not exposed at all to the outside elements

There have been three previous boats built to a similar design but *"Larinka"* encompasses the best of all that learned from the errors of the first three boats and we feel she *is the future* combining the comforts of a motor boat with the thrill of a sailing boat yet without all the hard work associated with conventional sail boats.

The wing is greatly more efficient than a conventional sail for the boom being 8 ft above deck ensures no wind buffeting occurs between boom/sail and sea and the computer scans both wind speed and direction every mille second. In turn the wing swivels to meet that wind for optimum performance as determined by the helmsman via the throttle lever at the helm.

Background to "*Larinka*"

Having been raised on the Isle of Mull on the West coast of Scotland until eleven years of age and then packed off to boarding school in England for my secondary education, the sea has always been in my blood.

Having spent the first half-century of my life building my businesses I decided that I should now enjoy the fruits a little and purchase once more a boat.

Oddly enough my own business is big in sustainable building so The Wingsail goes hand in hand with such ethos.

I have always liked the creature comforts of large powerboats/yachts but being a true Scotsman felt it a waste of funds in seeing gas being guzzled on channel hops in such craft and in such quantities, whereby in a sailing craft one does not suffer from such pocket emptying necessities!

However with time one gets used to creature comforts and I did not like the restraints of getting wet all the time in rough weather and having to deal with sails and ropes etc more than was necessary. These woes are not evident in the Wingsail.

For those reasons I declined from buying a substantial vessel.

In short a lazy sailor like so many other people who love the sea but do not care so much for the hardships!

Purchase of Craft

I was therefore intrigued to read about John Walker's efforts to create and produce trimarans using Wingsail technology in the mid to late 1990s.

A good friend, Gordon Chase of Shell went to the factory in Davenport in circa 1997 to view one for me but concluded that there was too much untested on these vessels and the asking price was a little high in relation to the inherent risks perhaps associated with the boats.

However the analogy as above of no ropes/inside steering position/creature comforts etc and also the look of the boat continued to intrigue me. I put such matters to one side and gave little further thought.

Purchase

Attending the London Boat show three years ago I noticed one of the Wingsails up for sale with an asking price in excess of £225,000 via Ancasta the yacht brokerage. Walker Wingsail and laterally Wingtek plc only ever built four of these rather unique craft.

I arranged to go down to Plymouth and meet Brian Butler from Ancasta. One of the most professional and affable brokers you are ever likely to meet.

The company Wingtek was in receivership, and the boat was being sold via Edward Simmons and partners on behalf of the receivers.

After negotiations I duly purchased "*Larinka*" and then the job commenced to put Humpty-Dumpty back together again.

Restoration

Dr Alison Cook and Dr Ann Toms of Cambridge University provided a good deal of input and technical assistance when stuck with alignment problems of the wing at an early stage. John Walker left no drawings, absolutely nothing at all to assist and we had to start a treasure hunt to find those involved in the building of the craft together with gleaning information from those previous owners.

Boat No 3 incidentally is in constant use by Dutchman Arth Loos who has already been around the word several times in his *Angel B* – his wing carries a transfer of one giant angel and it looks quite stunning.

The base craft was engineered as if a naval ship, and all that is for the good, but the finishing and electrics on mine were a nightmare.

I would suggest that to replicate this craft today using similar materials would cost literally millions, for the wing itself when dismantled for refit in Winter 2002 filled an entire hanger at the multihull centre.

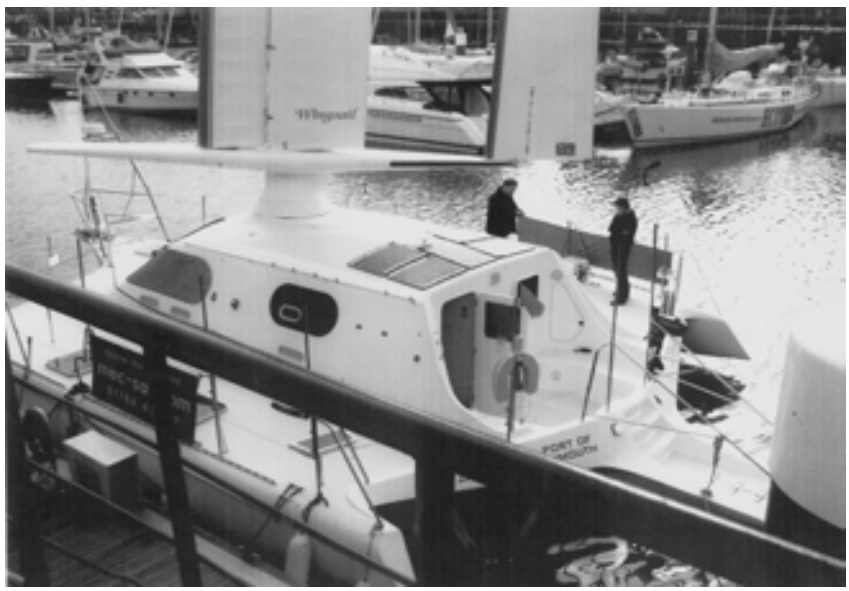
CE Proof of Southampton were very much involved, as were the varying European authorities in order to get her CE and Tuvi marked and then duly registered with the varying authorities. She now has SCV11 coding for charter and is currently based at Ocean Village in Southampton. Capt Dave McCarthy of MEC Sail look after here when not in my care and the boat is available for charter – check out the website www.mecsail.com for further detail.

All the initial building and considerable electrical work was carried out at The Multihull Centre at Torpoint in Cornwall.

Ian Page of Plymouth Composite Construction who works closely with DazCats supervised all the works and did a good deal of the work himself.

I cannot praise Ian Page enough for he looked after this boat as if it were his own and fretted over her as if she were a child. He did far more for her over and above the call of duty.

In June 2001 Ian presented the finished article to me and also to my real life wife after whom the Wingsail is named. She looked absolutely



magnificent sailing out of Millbrook marina and up through Drake's Sound and onto Gun Wharf Quays in Portsmouth.

She was berthed there throughout 2001/2 and became an almost tourist attraction for the shopping centre which had recently opened.

Air conditioning and generator plant were all added and a new computer (Micromariner) resurrected to run the wing. What a performance we had in getting back the people who were involved in its creation, for post fallout of Walker Wingsail everyone had gone their own ways and I did not meet John Walker until the craft was long finished and sailing!

Paul Joynson (ex UKSA in Cowes) who was her full time skipper for the first year did a great deal in helping to iron out teething problems and if I tell you there were a few then I would be understating the facts!

Result

The people at Ocean Village refer to her as the Concorde of the water for she really is a magnificent looking craft and especially so when viewed from ahead whilst out sailing.

Characteristics

Overall the lighter the wind the worse she is, but then does that not apply to most sailing craft?

Once the wind exceeds 12 knots, and in essence the higher the wind, the better the performance. When yachts are taking in sail "*Larinka*" soars and in high seas, high winds, she is magnificent – solid, steady and will give no cause for concern. She will ride the waves steadily and not roll from side to side. The boom being 8 feet above deck ensures little wind resistance, and if the wind speed reaches near hurricane levels then the wing itself merely feathers. My love is to sit on her bow seat (my "Titanic view") and watch the waves sweep under her hulls as she cuts through the water. Oddly, when sitting out in a good sea (up to Beaufort 5), this can be a dry spot depending on the angle of the wind.

Tacking and gybing are words of the past for one simply turns the wheel and the computer calibrates itself and you hear a whirr whilst it resets the wind speed and position of the wind and the wing and flap then adjust themselves automatically.

Conclusion & Way Forward

Despite whatever views whether right or wrong one has of its inventor, the proof is in the pudding, and this Wingsail works. Thank you John Walker for your foresight for despite all his troubles for whatever reasons I have enjoyed many hours in this lovely yacht.

Everyone is wise with the benefit of hindsight and if I were building another I would use a catamaran and not a trimaran (more space internally). So much space is wasted on *Larinka* it is almost criminal.

I would put in a stern drive as suggested below and ensure soundproofing of the engine was a high priority.

Current Boat

Larinka is fitted with a 55hp Yanmar inboard engine driving two legs, which in turn operate two drop down props in the outer hulls. These are inefficient and were for the first season fitted with all the allied hydraulics, which not only added weight but also were not 100% efficient… …testimony to coming in to berth when one leg did not engage into the water and the result was a dent in a new *Sunseeker* awaiting delivery!

What she needs and should have been fitted with is a 40hp inboard, which would not only be quieter but would operate stern thrust. A good deal of the power is lost via the drive shafts to the outer hulls and over 6 knots the noise is not acceptable if motoring for hours on end.

At 30ft in the beam she suffers from a little windage when berthing, so a bow thruster which was fitted in earlier models would have been an advantage.

Like all boats one can continue throwing money and making modifications but like everything under power she is quite manageable, albeit a bit tricky in close quarters. That area is her Achilles heel but she is classified as Category A and therefore designed for long distance cruising. To mitigate such we have installed an outside operating console, which allows you to dock with a hand help control, which operates the boat, rather than have diminished vision on docking from the inside position.

If anyone in the readership would like more specific details then I do not mind giving more specific and technical details on how she operates, perhaps in a future letter.

"Larinka" is owned by James Wright
102 Eaton Terrace
London, SW1W 8UG.

AYRS John Hogg Memorial Prize Award 2005

The AYRS announces another award of a £1000 Prize in memory of John Hogg, the distinguished amateur yachting researcher, who died in 2000.

The aim of this international award is to encourage and recognise important amateur contributions to the understanding and development of sailing performance, safety and endurance. Preference will be given to on-going work where the prize money is likely to benefit further development. Other than nominations for a "lifetime achievement" award, the work should have been performed within the last few years. Work that has previously been entered for the John Hogg Prize is not eligible, unless in the intervening period significant advances have been made.

Nominations, whether of oneself or another, should be submitted to the Honorary Secretary, Amateur Yacht Research Society, BCM AYRS, London WC1N 3XX, UK, to arrive by **1st October 2005**. Nominations may be made by or for anyone, whether or not they are a member of AYRS. Those nominating someone else must obtain the written agreement of the nominee and forward it with the entry.

'Amateur' in this context means primarily work done as a pastime and largely self-funded. Details should be given of any grants or other funding or assistance received. Work carried out as part of normal employment is not eligible, neither is paid-for research where the researcher does not own the results, but subsequent commercial exploitation of research need not debar work carried out originally as a pastime. A significant factor in determining the amateur status of such work is the ownership of the intellectual property rights in the results. Those with ongoing projects are as eligible to apply as those whose work is completed.

Whilst it is not essential that any innovations embodied in the work be demonstrated and "debugged", the work must have some practical application, which should be made clear in the entry.

The submission shall cover the following:-

- A summary, of not more than one page, identifying the nominee and the work submitted, and including a short statement of its merits to justify its submission.
- The description of the work itself, its novelty, its practical application, its degree of success to date, and (briefly) your hopes for the future. The work will be judged on the results achieved to date. Please spare us a complete history of your researches except to the extent that they are truly relevant. The use of your already published material, whether or not peer reviewed, incorporated in an entry, is welcome.

- Submissions must be made in English, in hard copy sent by post, to arrive by the due date. FOUR COPIES ARE REQUIRED – one for each of the three judges and one for the Secretary.
  Electronic transmission, the use of web site pages, and of direct extracts from patent applications (which are written by and for lawyers and can generally be shortened) have resulted in unsatisfactory presentation, hence the need for hard copy of a dedicated paper.

- Diagrams, graphs and photographs may be used, video material on VHS PAL videotapes or DVDs can be helpful supporting material. Programs and presentations on disk may be entered as part of a submission (accompanied by explanatory text etc). Appendices may be used, e.g. for mathematical workings. Direct reproduction of pages from an author's web site has generally proved unacceptable (due to formatting variations) and is not welcome.

- Entries should be printed on A4/letter paper in a legible font. Successful short-listed entries to date have ranged from about 22 A4 sides of text with 6 of photos, to one winner with 5 sides, 3 of photos and one A3 drawing. Clarity, legibility and brevity pays!

- Separately, a brief biography of the nominee(s) should be included, and their amateur status and qualifications should be explained.

- Nominees may care to say how they will use the prize should they win.

- AYRS will wish to publish brief summary accounts of entries, and may also seek further articles from entrants. Grant of permission to publish such articles is a condition of entry. To this end it will be helpful if entries can (if necessary) readily be abridged for publication in *Catalyst,* and if a computer disk copy of the entry is included. However any information received as part of a submission will be treated 'In Confidence' if so marked.

The winner and runners-up will be announced at the London Boat Show in January 2006. All short-listed entrants will receive one year's free membership of AYRS and a certificate; the winner will receive a cheque for £1000.

The Judges, whose decision shall be final, will co-opt experts as required to assist their deliberations.

Submission of an entry will be taken as signifying the entrant's acceptance of these rules.

Queries concerning possible entries may be made by phone or e-mail to the AYRS Honorary Secretary on tel/fax +44 (1727) 862 268; e-mail ayrs@fishwick.demon.co.uk.

Tips for making your entry effective

1. Never forget that the winner of the John Hogg Prize is the entrant who can persuade the judges that his/her work is innovative, has merit, has practical application, and is the most deserving of the prize. Your idea may be the best, but unless you can bring the judges to realise that fact, it will not win.

2. Remember the judges have only a limited time to look at each entry. Don't expect them to wade through pages of dross to find the nugget that is hidden in them. Present your work clearly and concisely, and in such a way that they quickly understand it, its merits and its practical application.

3. Be sure your entry will stand alone. Don't expect the judges to come back to you for more information – they won't. By all means refer to books, articles etc, but make sure the judges can comprehend your idea without going and looking them up. If they are interested, they may do so, but first you have to get them interested!

4. The judges are all practical people. You don't need to "talk down" to them; but on the other hand don't force them to read pages of mathematics! (See 2.) Equations may be useful to demonstrate a particular point, but long mathematical derivations are best relegated to an appendix.

5. It helps, but is not essential, to have already demonstrated the practicality of your work. Theory is fine, but unless the judges can see the practical application, it will not get their attention.

6. Presentation ought not to win prizes, but it does help get a good entry noticed. Don't just send a collection of loose pages - put them in a binder and give them a pretty cover/front page.

7. Remember a picture can be worth a thousand words; and a picture in colour can be worth more.

8. Remember too that those pictures do not have to be static. One of the better entries to date sent a video, with an intelligent commentary on the sound-track.

9. You can add a sound-track to PowerPoint presentations as well, but if you send a PowerPoint file remember that not everybody has PowerPoint software, so use the "Pack & Go" feature so your presentation will run on any (Windows) system. [Sorry, Mac users]

10. Don't expect the judges to go and read your webpage. They don't have the time. Use it as a supporting reference by all means, but if the information there is essential make sure it is packaged with your entry.

11. Remember to send enough copies of your entry – FOUR – one for each judge and one for the AYRS Office. The judges can view things like videotapes at their meetings, or they can pass them round; but they don't want to share paperwork, and the AYRS Office has neither time nor resources to do lots of photocopying.

12. Finally, don't forget to put in a disk (CDROM for preference) with all the printable material on it. Most entries get printed in *Catalyst*, often in an edited form. We need the files to work from. Oh, and don't forget to make sure the files are in a format we can read! (See the AYRS website submissions page for more help.)

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@fishwick.demon.co.uk**

January 2005

6th - 16th London International Boat Show
EXCEL Exhibition Centre, London Docklands. Those who can give a day or two, from 28th December onwards, to help build/staff the AYRS stand (reward - free entry!) should contact Sheila Fishwick tel: +44 (1727) 862 268; email: ayrs@fishwick.demon.co.uk

23rd 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). Details from Fred Ball, tel: +44 1344 843690; email fcb@globalnet.co.uk

23rd AYRS Annual General Meeting
4pm, Thorpe Village Hall, Coldharbour Lane, Thorpe, Surrey (as above). Details from the AYRS Secretary tel: +44 (1727) 862 268; email: ayrs@fishwick.demon.co.uk.

February

2nd AYRS London meeting
Subject to be confirmed. 19.30 for 20.00hrs at the London Corinthian Sailing Club, Upper Mall, London W6. Contact: AYRS Secretary, BCM AYRS, London WC1N 3XX, UK; tel: +44 (1727) 862 268; email: ayrs@fishwick.demon.co.uk

March

2nd AYRS London meeting
***Hydrofoil Sailing – James Grogono* (postponed from December).** 19.30 for 20.00hrs at the London Corinthian Sailing Club, Upper Mall, London W6. Contact: AYRS Secretary, BCM AYRS, London WC1N 3XX, UK; tel: +44 (1727) 862 268; email: ayrs@fishwick.demon.co.uk

April

6th AYRS London meeting
Subject to be confirmed. 19.30 for 20.00hrs at the London Corinthian Sailing Club, Upper Mall, London W6. Contact: AYRS Secretary, BCM AYRS, London WC1N 3XX; tel: +44 (1727) 862 268; email: ayrs@fishwick.demon.co.uk

May

2nd-6th or 24th-27th AYRS sailing meeting
To be confirmed. Portland Harbour, Dorset, UK. (Neap tide, going to Springs). Shore location to be confirmed.

October

1st-7th Weymouth Speedweek
Portland Sailing Academy, Portland Harbour, Dorset UK. Contact: Bob Downhill; tel: +44 (1323) 644 879

5th AYRS Weymouth meeting
Speedsailing. 19.30 for 20.00hrs at the Royal Dorset Yacht Club, Upper Mall, Weymouth. Contact: AYRS Secretary, BCM AYRS, London WC1N 3XX; tel: +44 (1727) 862 268; email: ayrs@fishwick.demon.co.uk

November

2nd AYRS London meeting
Subject to be confirmed. 19.30 for 20.00hrs at the London Corinthian Sailing Club, Upper Mall, London W6. Contact: AYRS Secretary, BCM AYRS, London WC1N 3XX; tel: +44 (1727) 862 268; email: ayrs@fishwick.demon.co.uk

December

7th AYRS London meeting
Subject to be confirmed. 19.30 for 20.00hrs at the London Corinthian Sailing Club, Upper Mall, London W6. Contact: AYRS Secretary, BCM AYRS, London WC1N 3XX; tel: +44 (1727) 862 268; email: ayrs@fishwick.demon.co.uk

AMATEUR YACHT RESEARCH SOCIETY
2005 ANNUAL GENERAL MEETING

In accordance with the notice given in October's *Catalyst*, the 41st Annual General Meeting of the Amateur Yacht Research Society Ltd will be held on **Sunday 23rd January 2005** at the Village Hall, Thorpe, Surrey, starting at or after 4.00 pm. The AGM is open to all paid-up members and their guests.

AGENDA

1) Apologies for Absence.
2) Minutes of the 40th Meeting concluded on Wednesday 3rd March 2004 at the London Corinthian Sailing Club, Linden House, Upper Mall, London W6.
3) Chairman's Report.
4) Treasurer's Report and Accounts
5) Confirmation of President and Vice-Presidents, Election of Officers and Committee Members.
6) To appoint a Reporting Accountant for the year.
7) Any Other Business
8) Vote of thanks to the helpers of the society.

Minutesof the 40th AGM: The draft minutes will be available at the meeting..

Chairman's Report: Centrepage pullout in *Catalyst*

Directors Report: Centrepage pullout in *Catalyst*, as is a Financial Commentary.

Officers and Committee Elections: Under our rules, the Vice-Chairman (Fred Ball), Secretary (Sheila Fishwick), Editor (Simon Fishwick), and Committee Members John Perry, and Graeme Ward have completed their current terms of office. They are all willing to serve again. Any other nominations should be submitted, preferably in writing, to the Hon. Secretary, Sheila Fishwick, by or on 16th January 2005.

Reporting Accountant: The Committee propose that Robin Fautley be re-appointed.

Any Other Business: No matters have been submitted for this Item. Any items for formal consideration should be submitted by or on 16th January 2005.

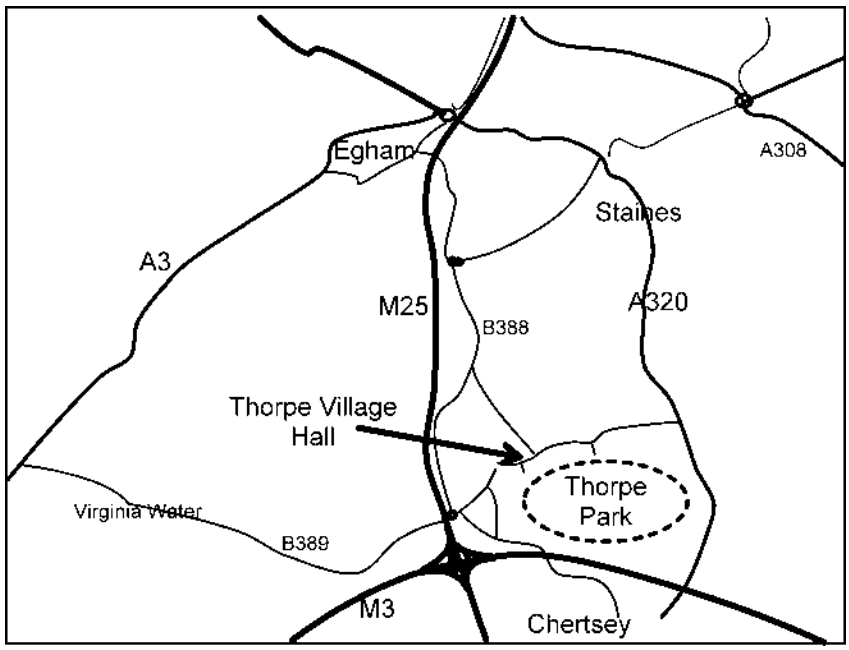
Sheila Fishwick
Hon. Secretary
Fax: +44 (1727) 862268;
email: ayrs@fishwick.demon.co.uk

How to get there

Thorpe Village Hall is in Coldharbour Lane, off the A320 between Staines and Chertsey, close to Heathrow Airport, and to Junctions 13 (Staines/Egham) and 11 (Chertsey) of the M25 Motorway. (Note there are extensive roadworks on this section of the M25, and delays and diversions can be expected, especially on a Sunday.]

From Staines, follow the signs for Thorpe Park and turn right oposite Penton Hook Marina (signposted Thorpe Village).

Note: Parking close to the hall is very limited, and the parking regulations have changed; it may be necessary to park outside the village and walk in.



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

On the Horizon . . .

Wave power - Ken Upton
Yulohs and anchors - Mike Bedwell
More sources and resources: reviews, publications and Internet sites

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

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