Catalyst

Journal of the Amateur Yacht Research Society

Number 35 July 2009

How to supply information for publication in Catalyst:

The Best way to send us information:- an electronic (ascii) text tile (*.txt created in Notepad, or Word, with no formatting at all, we format in Catalyst styles). Images (logically named please!) picture files (*.jpg, gif, or *.tif). If you are sending line drawings, then please send them in the format in which they were created, or if scanned as *.tif (never as JPEGs because it blurs all the lines)

Any scanned image should be scanned at a resolution of at least 300 ppi at the final size and assume most pictures in Catalyst are 100 by 150mm (6 by 4 inches). A digital photograph should be the file that was created by the camera. A file from a mobile phone camera may be useful. Leave them in colour, and save them as example *clear_and_complete_title.jpg* with just a bit of compression. If you are sending a CD, then you can be more generous with the file sizes (less compression), than if emailing, and you can then use *.tif LZW-compressed or uncompressed format.

For complex mathematical expressions send us hardcopy or scan of text with any mathematical characters handwritten (we can typeset them), but add copious notes in a different colour to make sure that we understand. WE can also process MS Equation and its derivatives. Include notes or instructions (or anything else you want us to note) in the text file, preferably in angle brackets such as <new heading>, or <greek rho>, or <refers to *image_of_jib_set_badly.jpg*>.

Otherwise: — If you write in longhand, and sketch or include photographic prints, and trust to snail mail (a copy, never the original) then all can and will be dealt with in due course. If you have trouble understanding anything in this section, email to ask.

As examples, the polar diagram p16 of *Catalyst 28* was re-created from a second generation photocopy, photos of shunting in the Champion article in *Catalyst 27* (pp 19-21) were screen grabs from a video supplied on DVD. The rest of the images in that article were scanned from photographs, and the text was OCRed (Optical Character Recognition software) or keyboarded.

Send a copy of your work (copyshops can scan to file and email for you):

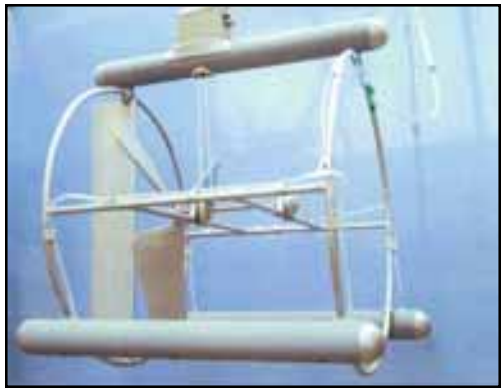
by email: catalyst@ayrs.org,
by fax: +44 (8700) 526657, or
by post: Catalyst, BCM AYRS, London, WCIN 3XX

Features

6 *Single-oared sculling*
Mike Bedwell

9 *Water Power Turbine*
Chris Watson

14 *Sunk without trace?*
Roger Glencross



Regulars

3 *News & Views - Your letters*

18 *Chairman's Notes*

19 *Call for papers - Innovsail 2010*

20 *Catalyst Calendar*

Cover Picture:
Michael Bedwell
contemplating his sculling oar
Photo: M D Harrison

Catalyst

Journal of the
Amateur Yacht Research Society

Editorial Team —
Simon Fishwick
Sheila Fishwick

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

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

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

AYRS subscribers receive both *Catalyst* and the booklets. Subscription is UK£20 or US$30 per annum for a Full Member, £10 or $15 for students and retired members. Subscription requests and all other queries to be sent to the AYRS Office, BCM AYRS, London WC1N 3XX UK, email: **office@ayrs.org**

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

Website: http://www.ayrs.org

ISSN 1469-6754

The Howard Fund

In April 2005, Mr Donald Howard, a member of AYRS, died, and having no family, left his estate to be divided amongst a number of charities, one of which was, to our surprise, the Amateur Yacht Research Society. Of his residual estate, we were left 30%, some £42000, with the instruction that the Committee use the money to "provide funds as grants to members for further development of their practical ideas".

In principle, we could give it all away in one hit, but we think it would be more use if we made the money last over a number of years, and a number of projects. This will allow people time to think about what they need and when. So we have decided that we will distribute about £5000 each year, which means we can go on for about seven years. This will usually be a number of small awards.

We have also decided that the projects to which we give grants: a) have to be practical (as Mr Howard required); b) they have to further nautical science or knowledge of nautical science (to be in keeping with the objectives of AYRS); and c) that grants will be awarded on merit and according to need, after review by the Committee and any panel of experts they may appoint.

We think that members should be given an opportunity to assess and react to the project proposals, so, after an initial screening by the Committee, we will publish them in Catalyst.

The first of these appears in this edition - Chris Watson's development of a water power turbine.

Please read it carefully and tell us what you think. You should know that the Committee are minded to support this application, at least to the extent of £1000. But we still want your feedback, not only on its merits, but also on how it could be improved. All comments, published or not (space limitations) will be passed on to the Committee and the applicants.

We've had our view, now it's over to you. Send your comments to the usual AYRS address, or (preferably) to Catalyst@ayrs.org in a form we can publish.

Cement Trading Vessel for rough conditions

Hello Amateur Yacht Research Society:

I am in the process of experimenting with an unusual sailing ship which I hope will interest you. I can use all the help and advice from your members.Please circulate this project to anyone who may seriously be interested.and please refer to me any sites I should visit.

You will find the information of the 12 m cargo ship on my blog at: jollyheartwaves.blogspot.com

The design of this 12 m prototype is based on the "blazer"... a flat bottom sailing fishing boat built in 1885 to sail in extremely rough seas off the Dutch coast. I adapted the design so that the ship can be completely turned over and come back up again. The topsides are about 1 inch thick(2.4 cm) and the bottom is about 6 inches thick. It it has to be very strong on the bottom for beaching in rough seas. It must come down a wave fully loaded with 20 tons cargo , smash on sand or small stones , and not split open like a watermelon. Everything about the design is made so that it can withstand rough treatment with little upkeep. The holes in it are for ropes to be put through so that everything can be tied on... including the lee boards on each side, the mast and rigging,the bowsprit, and the rudder. There are no bolts or screws. The interior also has holes for ropes to be tied. .. so that it is rather like a spider web inside... nets can be hung for sleeping in, and cargo can be tied down. This facilitates easy cleaning , because cargo is often messy. If fresh produce is taken, cockroaches must be easily cleaned when the interior is washed.

I've had a lot of trouble in its construction, saturating with cement the 12 layers of wire mesh used for reinforcement. The wire mesh is expensive. I found a solution by replacing the wire mesh with small polyester strands which can be mixed in with the cement. Also I find it's possible to add bubbles to the cement so that the cement can actually be lighter than water. This will mean that the ship will float when being damaged with a hole and is extremely well insulated. On the planned larger 24 meter ships, the hull thickness could be over 1 meter thick, thus giving fantastic insolation for refrigerated cargo. The ships can also take cargo such as live fish swimming in the hold. There should be no need for paint. The growth on the bottom could be washed by hand.

The ship could be made from other materials also. For example, sections could be stamped out of stainless steel, and then welded together.

I understand there's a shipyard in northern Holland that builds this traditional ship in wood, for a cost of about •250,000. I think I can get the cost down to about 1/10 that amount using mass production techniques, and inexpensive labor in my shipyard on the beach of India.

Regards, Capt. Roger Retting

PS I would like to get more information(if it exists) on the mix of bubbles or foam ,the cement and the polypropylene. I have been looking for experiments using this technique...And I have not found anything.

Correspondence on Yulohs

Dear Sirs: Having spent a good deal of my life in China, I think I can probably clarify the modus operandi of the yuloh for your readers:-

David Shannon is very wide of the mark with his suggestion (on Page 5 of Catalyst No.34) that the lanyard fixing to the handle is unnecessary - it is in fact one of the most important features as it controls the feathering of the oar blade. The 'T' shaped binding of the lanyard is very firmly fixed so that, as the left or right hand of the operator pushes or pulls on the 'T's stem, the oar is feathered correctly for the stroke involved.

This is seen clearly in the left-hand picture on Page 8 of No.34. The action is simple and smooth - this operator pulls on the rope with his right hand and then follows immediately with a steady pull on the oar shaft with his left. At the end of the stroke, he reverses the action by simply pushing his 'T' rope following smoothly with a strong push on the oar. While Worcester's drawing on Page 3 illustrates the special double curve of the yuloh, it doesn't really show the 'T' shaped binding. I hope this clarifies matters for your readers.

Sincerely, Roger Napier.

Hi Roger

I am interested to hear that you have some experience of the yuloh during your time in China. I wrote the article printed on page 8 of the Catalyst no.34 which I offer as a discussion document, and hoped to get some constructive feedback, but so far have not received much. The problem is that although many people see something happening not many can describe the action in technical detail, but your few comments in the open letter to AYRS suggests that you can.

Could you tell me exactly what you mean by "the 'T' shaped binding"? Is it simply that the lanyard is tightly tied to the loom of the yuloh and does not slip round when pushed from side to side, but rather rotates the loom and hence the blade when pushed/pulled?

I would appreciate your comments on the article I wrote, as I believe there is a lot for us to learn about the apparently efficient but basically simple method of propulsion. Bob Groves, a member of the Junk Rig Association, has been cruising the Atlantic for a couple of years without an engine and only using a simple straight sculling oar which he referred to as a yuloh, and was getting some drive but finding it hard work. He built a yuloh to the 'recipe' I wrote in my article and he has found a great improvement in performance and a much lower energy input required.

Bob wrote - "Finally built the yuloh for Easy Go using your "Yuloh Recipe" It is very powerful and well balanced. It is built of Nova Scotia black spruce that I bought from a farmer. He had cut it for barn board siding but felt it was too good for that as it was virtually clear. This made the weight of a twenty foot oar manageable. I find that it floats a bit so will add some weight to the tip to get it too stay down."

And later he wrote-

"First the yuloh news. We have it all figured out now. It propels the boat very powerfully and one needs to resist the desire to push too hard as it only makes it expends more effort with little result. My standing position is under the arch and as it is mounted on the port side I am using the rope in my right hand with the left providing minimal assistance. Following the "recipe" has provided a unit that I don't think can be improved on. We are building some chocks to support the yuloh on deck and with a new set of stanchions on the boat we made one removable so that there are no obstructions to the yulohs use.

The blade floats a bit as did our original sculling oar. When I start sculling I support the yuloh with my left hand and within two strokes of gradually increasing pressure the yuloh stays down and goes into propulsion mode. When one stops sculling it rises to the surface where it rides or can be lifted clear of the water and remain on the pin until one puts it back on deck.

We can scull against a ten knot wind and run over the anchor and chain without difficulty. We are heading north to Cape Breton Island and Newfoundland over the next couple of months and will have much more experience by the time we get back. I should have more pictures and plan to write an article on its construction and use. I'll send it along to you for review before submission."

Obviously I want to learn more and if there is anything you think you could add I would like to hear what you have your comments.

Regards

Slieve

Slieve:

You are really 'on the ball' - your reply was one of the fastest I've ever received!! Your second para. has it right - the lanyard, because of the firm attachment, puts the correct angle on the oar making for a very easy push/push & pull/pull action. Another point is that the ones I've seen always had the pivot mounted centrally on the stern (between port & starboard) so that it was simple for the operator to change sides, thus exercising both sides of his body equally.

The final point to mention, I think, is to try to follow the overall shape & proportion of the oar shown in Worcester's diagram. If this is done, it should not be necessary to weight the tip of the oar as was done by your disciple Bob Groves. I hope this has been helpful

Sincerely,
Roger Napier

Catalyst 33

The following are comments on articles in Issue 33, January 2009:

1. Flex Foil Wind Generator by Jack Goodman:

This ingenious occasional wind generator is a good idea for a boat in an area with plenty of sun – provided that it can be hoisted without fouling the sails. However, I dispute some of his criticisms of alternative wind generators. I fitted an Aerogen 4 Windcharger in our 20ft trailer-sailer Red Fox sloop and it has provided electrical power onboard for some twelve years (navigation & cabin lights, instruments, tiller pilot). It is not noisy. It does not require the blades to be stopped in high winds, the regulator simply feeds excess current into a resistor.

The Goodman design is definitely NOT a type of Flettner Rotor. It is a simple form of Savonius Rotor . The Flettner Rotor is a rotating cylinder which produces lift at right angles to the airflow. It was used to power merchant ships in the 1930's. It was a brilliant invention but suffers from comparatively high drag. The Flettner company also made a roof ventilator for vans which used a Savonius Rotor, which is confusing.

2. Delta-shaped sails by Richard Dryden:

As one of the few survivors of the first Hang Gliding era (I have over 1,300 launches in my Log Book) I can endorse Richards's conclusion that the single-surface Delta wing has indeed the peculiar property of sustaining an very large angle of attack before stalling. It was possible to descend vertically to the ground in a stall. However, the descent rate in normal flight was about 1,000ft/min, whereas this reduced to about 250 ft/min with a double-surface wing of high aspect ratio which also had a much better L/D ratio (glide angle).

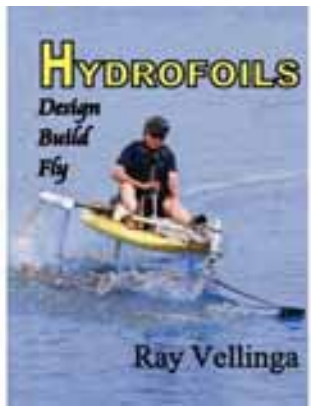
3. A Captive Kite-Sail Design by J.G. Morley:

Mr Morley's article describes a well-thought out design with an ingenious method of ensuring that it does not take off. I suggest that the rectangular shape of his sail suffers from large tip losses & consequent high drag. Also, as an enthusiast for tilt rigs I suggest that it is better to forego the lifting effect of such a rig & let it oppose a parallel angled keel. There is then no danger of the craft taking off in the horrifying manner of SailRocket & depositing the helmsman at high speed, upside down into the water.

Michael Collis

New Video & Book

Just in time for the Oscar nominations, I have produced an exciting new hydrofoil video. Click on or copy and paste into your URL: http://www.youtube.com/watch?v=ausE8iCsCoI
or go to Youtube.com and search for *Flying Hydrofoil Ray*.



My book covershow to design, build, and fly hydrofoil boats. It begins with the history and theory of hydrofoils, and continues with an explanation of flight characteristics, such as; stability, control, lift, drag, cavitation, and ventilation. Foil configurations, weight and balance, flying height, and roll management are covered as well as calculations of stress, hull configuration, and wing sizing. One section demonstrates methods for comparing designs, and explores specific design ideas for motorized, human powered, and sail powered hydrofoils. This very complete book includes over 270 illustrations, charts and tables on the subject of creating hydrofoil boats. Because hydrofoils fly like airplanes, except in a denser fluid, the book's subject could be described as aerodynamics adapted to hydrofoils. I think it's the best book available for hydrofoil enthusiasts.

Ray Vellinga
International Hydrofoil Society

Single-oared sculling

Mike Bedwell

This is an up-date of my report in *Catalyst* No 30, April 08. In some ways, I've made little headway: I was let down by the individual who'd undertaken to make a raft to my drawings published in that report, and I paid the price for an over-hasty attempt with an alternative design that made too many concessions to my limited skills and building resources.

The photos show the outcome; a 'daft raft' on which I'd hoped to demonstrate my technique with a single crew, and to extend later so as to carry a second one. Stupidly, I overlooked one fundamental but unexpressed criterion: that my efforts with the oar should move the craft forward, and not in circles! With the wisdom of hindsight, I realize that the bilge keels in my cruiser *Mercia Maid* serve a role in sculling as vital as when sailing close to the wind; there is no getting way from the need for large lateral resistance, provided by either keels or the twin hulls of a conventional raft.

But there were some positive outcomes: the construction may be of interest to others needing a light, shallow-draught hull, and so is detailed in the appendix. But more importantly for me, the raft did serve as a stage prop for my public demonstration on the short length of disused canal in Calne, Wiltshire. In particular, it got me into contact with the Richmond Fellowship, a not-for-profit organization for adults recovering from mental health difficulties. The Fellowship has a number of centres in Wiltshire, including one on the Kennet and Avon Canal in Bradford-on-Avon. So the manager and I have made tentative plans for his people to build a raft in the oil-

drum and plank tradition, and for me to provide the special asymmetric paddles that have worked so well in *Mercia Maid*. While the Richmond Fellowship has only a modest remit in Wiltshire, the overall vision is to offer opportunities to the disadvantaged on the canals analogous to those already opened up at sea by sailing ships like *Lord Nelson*.

I have now taken delivery of a paddle with a pear-shaped section, which an article in *Catalyst* some years back[1] suggested, for low Reynolds Number applications like mine, should be more effective than my original tear-drop section. So far, I have detected no significant difference, but the good news implied by Peter Sharp's ' How Wings and Sails Work' (*Catalyst* 25, July 06, p22) is that I should not be surprised at this, lift being determined less by the geometry of the foil section than by the angle of attack.

Construction.

I suspect that my subconscious inspiration was the Kon-Tike, the balsa raft which in the 1940s Thor Hayerdahl sailed over 4000 miles across the Pacific. By similarly floating the deck directly on the water, I argued that I could avoid the need for a stressed and therefore heavy structure to support the crew weight.

Polystyrene rather than Balsa and straw was used for the deck. This was cut into strips measuring some 80 inches (2000 mm) long – to conform to the 7ft (2.1m) width of the English narrow canals – by 6 x 2 inches (150 x 50 mm), and pierced with three 2inch (50mm) holes parallel to the 2"dimension, two near the beam edges and the third in the middle . Similar holes were drilled in some thin 80 x 6 inch plywood strips; these were stacked in alternation with the polystyrene before threading them onto three 2 inch OD aluminium tubes. Loops of

2.5mm polyester rope were threaded down the poles and, together with Jubilee clips and some short lengths of hollow bamboo, used to tighten the polystyrene and plywood together, tourniquet style. The overall approach was thus comparable to reinforcing a loaf of bread by first slicing it, then sandwiching some tough, fibrous meat in-between, and finally skewering the lot together.

From the photographs it can be seen that the fore-and aft length of the 'cockpit' was only about 30 inches (750mm). This was calculated to be enough to support 100Kg of crew + raft self-weight, but to be low enough to cause the 'bow' to rise, with the aim of reducing the forward resistance. A large part of the self-weight was contributed by the triangular boards at either end of the cockpit; these were needed to support a crutch at some 20" above the waterline, as dictated by the geometry of my paddle. A further tube and a system of guys served to make the structure rigid and to transmit the paddling forces to the metal tubes in the hull best able to withstand them. To confer fore-and-aft stability the two outboard tubes were extended a further 60" (they had been supplied with swaged ends to permit this); these supported a thin transverse horizontal plywood fin at the stern. As shown, vertical fins were also U-bolted to these extensions in the forlorn hope of providing the lateral resistance needed for sculling.

The tubes were supplied by Haydon Communications (www.haydon.info), and the other materials from builders' merchants.

Michael_Bedwell@hotmail.com

[Photos (c) M D Harrison & M Bedwell]

[1] By Gabriel Elkaim, an American PhD student developing an unmanned autonomous sailing craft. [Catalysts 16 & 17, April & July 2004]

Water-Powered Turbine

Application for a Grant from the Howard Fund

Chris Watson

This year I have been working on a number of projects to produce a vessel that is able to generate clean energy from either tidal flow or from river currents. I am applying for funding to enable me to focus on the one I think offers the greatest potential and I enclose information about the progress I have achieved so far. This includes the information that I submitted when I applied for a patent, now obsolete because of later modifications. It does, however, explain the concept and the various stages in the development of my ideas. When I approached the Carbon Trust and Marine Current Turbines, I had reassuring comments from both, although the latter did suggest that mooring such a craft could present a real challenge. The most useful contribution to nautical science that my idea offers is likely to come from the development of the turbine blades and improving their efficiency. This might in fact have the opposite application when used for propulsion as a propeller to impart energy rather than to extract it as a turbine does. I also think that this project might provide some information that could lead to advances in the design and performance of a vessel with a dagger plate or fin keel by calculating any potential propulsive power and the drag created by this configuration as it cuts through moving water.

So far I have designed, made, and tested three types of turbines. The first and perhaps the most conventional can be seen in photograph 1. This has three blades, each blade having the usual aerofoil section with a twist along the entire length. The angle of the pitch can be adjusted to achieve the optimum performance. The next turbine has virtually the same dimension (600 mm diameter). The blades are made of flexible plastic with a rigid fixed steel leading edge and has no pitch until put under pressure from a current flow. The advantage of this design is to rotate only in one direction even when the water flows in the opposite direction as in the event of a tidal change. This device produced adequate energy to drive a small dynamo but had a much higher drag, which on a larger vessel would put a heavy load on the moorings. The most recent set of blades that I tested are free to rotate to about 30 degrees either side of their axis and thereby achieve their operating pitch. This appears to be the most efficient way to make a turbine blade that will cope with a 180 degree change in the direction of the water flow without too much drag or loss of power.

If this project were to be considered worthy of a grant, this would enable me to make a larger model that I hope could produce a useful amount of energy that, as suggested by the Carbon Trust, might be suitable in areas where existing power supplies are not sufficient or have been disrupted. If this system is contained in the form of a catamaran, no matter the scale, it can always be portable.

I think the catamaran that would have to support the turbine, with its rigid frame and generator, would need to be at least four metres long and have a beam of two metres. By using marine ply, glass fibre and galvanised tubing for the prototype, the cost should not exceed £500. The cost of the generator, turbine bearings and transmission system are more difficult to calculate because it is often possible to obtain second hand parts. However, £500 should provide most of these components making an approximate total of £1000.

Ipswich UK

Water Powered Turbine

ABSTRACT

A water powered turbine equipped with one or more submersible chambers 2 that may or may not be attached permanently to the structure that supports the turbine. The chambers can be flooded to submerge the entire turbine or pressurised with compressed air to expel the water and lift it to or above the surface. The turbine is tethered rather than permanently attached to its moorings and may therefore be brought to or removed from any site where there is sufficient water to float it.

This invention relates to a water-powered turbine to which buoyant and submersible chambers may be permanently attached or made removable. The purpose of this invention is to create a system whereby a water powered turbine can be transported, fully assembled, over the surface of the water to or from an area where it is intended to operate, and can be raised or lowered to a desired height or depth in a fully operational form or for its removal or for servicing in situ. This is achieved by releasing air, via airlines attached to ports on the chambers, allowing water to enter through other openings. The process can be reversed by introducing compressed air from a vessel or an independent structure on the surface, or even from the chamber itself or another source. The whole structure may be tethered, rather than being permanently attached to the sea or river bed, or shore. By making the chambers in the form of elongated cylinders a stable and manoeuvrable support for the turbine and power transmission system is achieved and could provide protective housing for the generator if required. Towing, positioning and choosing the operating depth can all be done above the water, eliminating or, at least minimising, the work carried out under water.

The choice and range of materials used in the construction of this system is wide and can be varied according to size and operating requirements, Materials used might include metals, ferro-cement, plastics, glass reinforced plastics, and even wood. The components, such as the turbine blades, drive gears, and generators, are readily available from established manufactures.

The whole system can be operated under water, therefore the visual impact is nil, even with one chamber on the surface it is not particularly intrusive. Moreover this system does not increase the disruption to radar signals

as do some other forms of renewable energy. The following drawings are intended to make clear and explain the properties of the invention

In Figure 1 unit 1 is the top of the housing for the generator which is mounted within the chamber 2. This chamber is attached, as are the other two chambers 2 to the frame structure 7. The airlines 6 are able to vent air in and out of ports on the surface of the chambers. 4 shows the turbine which is attached to the power transmission casing 5 which in turn is attached in this form to a buoyant chamber.

Figure 2 shows the same aspects of the design as in Figure 1 but in addition one can see 3 the possible fastening point of the chambers to the frame structure and also openings 8 on the floats to allow water to flow in or out to regulate the depth.

In Figure 4 the generator 9 and housing is shown coupled directly behind the turbine and mounted on a cross beam 10 the profile of which would take the form of a symmetrical hydrofoil to enhance the water flow.

In Figure 6, 11 represents the augmenting cowl.

CLAIMS

1. A water-powered turbine utilising removable or permanently fixed buoyant and submersible chambers to energise a generator or machinery by maintaining its position and depth in a moving current of water

2. A water-powered turbine according to Claim 1 in which the buoyant and submersible chambers could be utilised to provide support above the surface for the purpose of servicing or transportation.

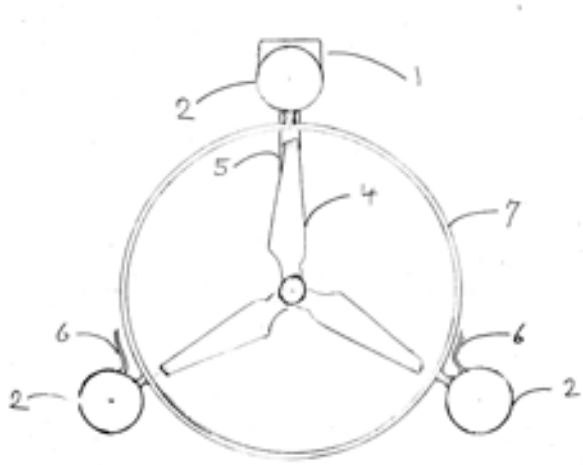


Figure l shows a front view of the turbine, chambers and supporting structure around it.

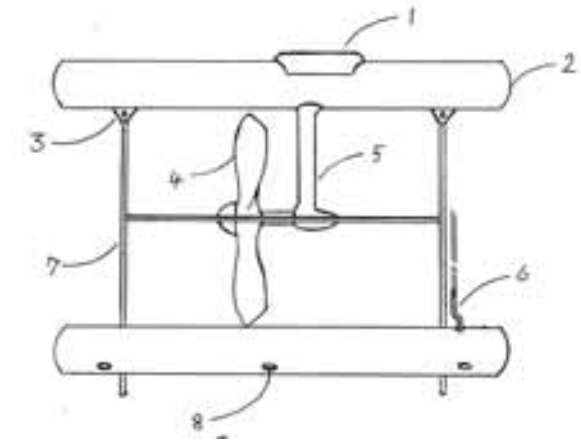


Figure 2 shows the arrangement from the side together with the chambers and turbine.

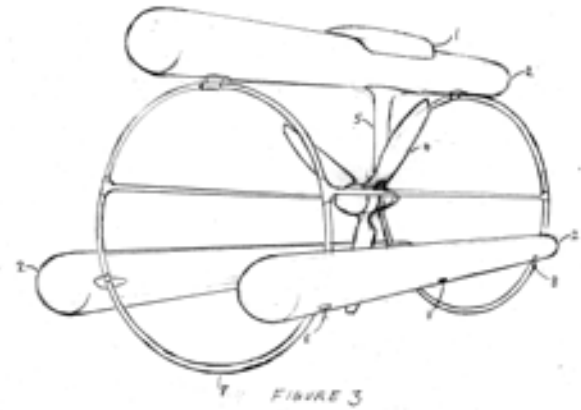


Figure 3 shows a three dimensional view of the turbine, the frame structure and the chambers in this particular configuration.

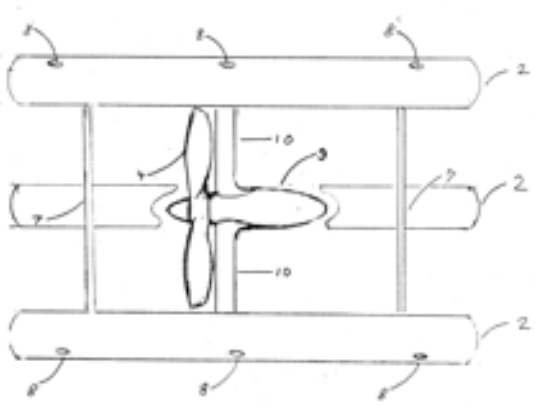


Figure 4 shows the turbine viewed from beneath showing the alternative siting of the generator directly behind the turbine.

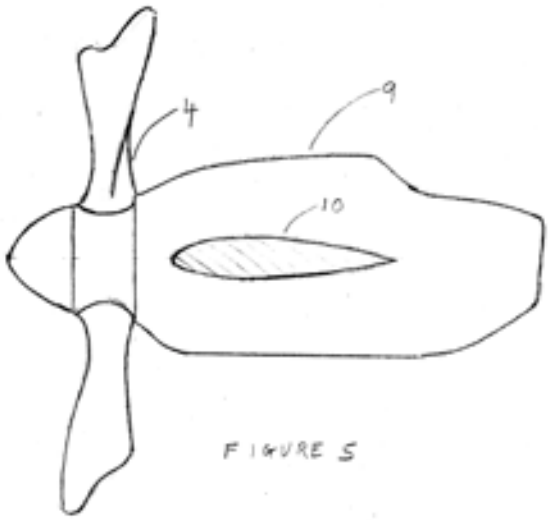


Figure 5 shows the generator coupled directly behind the turbine and supported by a cross beam in the form of a symmetrical hydrofoil.

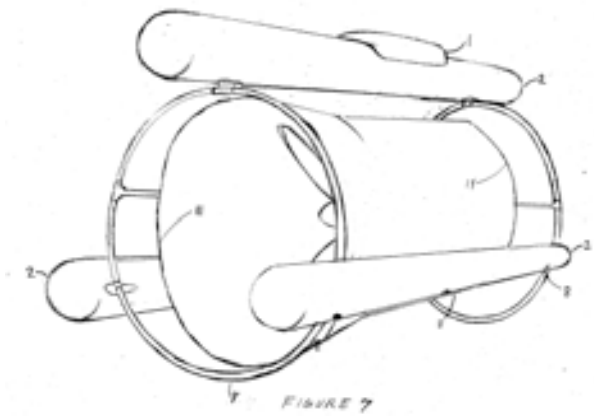


Figure 6 shows the turbine surrounded by a cowl to direct the water flow to the blades.

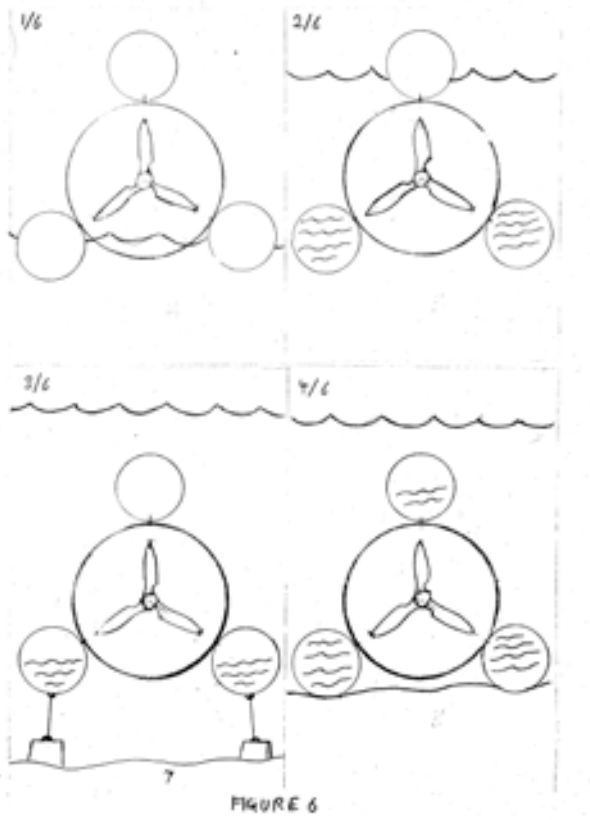


Figure 7 shows the front view of the structure in four differing operating modes.

3. A water-powered turbine according to claim 1 in which the turbine could be suspended below the surface with one or more chambers floating on the surface.

4. A water powered turbine according to claim 1 that could be held in suspension at an appropriate depth part way between the surface of the water and the sea or river bed.

5. A water turbine that according to claim 1 that is able to be lowered to an operating position on to the sea or river bed.

6. A water turbine that according to claim 5 that is capable of being lowered onto the sea bed and is also capable of being returned to a position above the surface.

7. A water turbine that can be deployed wherever there is sufficient water and current to float and operate it.

8. A water turbine that is readily and easily transportable in a fully functioning form ready for immediate use.

9. A water turbine that according to the mode of operation has nil or little adverse visual impact.

10. A water turbine that provides energy that does not disrupt radar signals.

11. A water turbine that provides energy with minimum damage to the environment.

12. A water turbine that can be manufactured utilizing well established and readily available technology.

Notes to Photos

1 This is described fully in the patent application.

2 The turbine shown in this photograph is suspended below a flotation craft in the form of a catamaran. The generator is coupled directly behind the turbine blades and both components can rotate to meet the flow of the current. They can also be raised mechanically above the surface for transportation.

3 and 4 show other variations that do not employ compressed air to raise and lower the turbines. Photo 3 shows the generator and turbine lowered and ready to operate. This can also be raised mechanically to a position above the water. Photo 4 shows the same device operating in a fast flowing current with the turbine rotating below the surface.


1


2


3


4

Sunk without trace?

A review of stalled yachting projects.

Roger Glencross

In view of the small number of experimental craft at last Speedweek, and the small number of *built* experimental craft covered in the most recent Catalysts, it has been suggested that amateur yacht research is dead. It has been claimed that all would-be projects are too difficult, too expensive, too dangerous, need unavailable facilities such as high speed test tanks, or need huge teams of helpers, and that therefore AYRS should wind up and we should devote ourselves to saving the planet!

Let us go through the last eight years's projects (with a slight foray into earlier years), and see if this is true.

I have not gone back to the year dot because many early experiments have been overtaken by technology. With many of them the kindest thing to do would be to put them aside, because they are re-inventing the wheel. There is only one rule of yacht research – don't re-invent the wheel!

There is the danger of sounding like a grumpy old man when listing stalled projects so I will lighten the mood by dividing them into projects which have sailed (where arguably they can be classified as successes, even if limited or negative successes), and projects which exist only as ideas, theories, plans, models or maths. I have nothing against these. All projects start that way. My complaint is that many projects that deserve better never get past those stages.

Why do projects become stalled?

The reasons can be divided into two categories: personal and technical. The personal reasons are family and work commitments, illness, old age, project pushed aside by a better project, new interests, procrastination, demoralisation due to constant failure, lack of persistence and lack of moral fibre. AYRS cannot help with these. What is needed here is not AYRS, but the power of prayer.

It is with the technical reasons that AYRS can help: - the need for assistance, both in quantity and quality. You may need five people to launch and crew your project but you are on your own. You need a sailmaker, engine specialist etc. but you are only a boatbuilder. You cannot see the solution to a technical problem, or the project seems to be going nowhere e.g. it is slower than similar boats. Should it be abandoned or have you simply not cracked the problem? Is a new set of eyes needed on the project? Ask for help by telling AYRS. Write up your *failures*. More is learnt from failures than from successes.

You will note some omissions in the above. Some apparent reasons for stalling are in reality just excuses. The classic one is lack of money. The answer is to build a smaller craft, build a model, use base materials instead of exotic materials or build a bit of yacht equipment instead e.g.:- rig, foil, etc. The perfect is the enemy of the good. And then there is the perennial whinge of lack of space to build. All the above apply. In addition you can assemble your craft on the beach, construct it in a friend's garage, rent a shed, move house! "if a job's worth doing, it is worth doing badly" (G.K. Chesterton).

A universal excuse for putting aside a project is death. Don't let your death hold up your excellent project. Write up your hobby notes, publish your successes *and failures* in Catalyst as you progress, put your videos on the internet, bequeath your notes, models, hardware and full size craft NOT to your contemporary sailing pal who will die before you but to AYRS. AYRS cannot store them but we can publish your notes and films, photograph and measure your craft and offer it to AYRS members.

Full-size craft which have sailed.

One can divide these projects into three categories:- (a) projects which have further research potential, (b) projects which have run their course, including projects which have been completely successful, if only in having achieved their very limited aim, including negative successes, i.e. conclusively shown that that is not the way to do it: and (c) projects which are only a vital part of that particular yacht builder's personal learning curve (arguably the largest category).

We need to build an AYRS learning curve to save duplicating past experiments and mistakes. This requires us to publish failures. It also requires humility, to accept that our predecessors were not complete idiots, and may even sometimes know more than us. If a chap builds an experimental yacht which capsizes and drowns him, find out why it capsized and build it better. If in our pride we ignore the past and build the same yacht, it capsizes and drowns us too! Where is the progress in that? It is said that we never learn anything except from our own experience. If that is true it is very sad and will slow down research greatly. Show faith in what has gone before. As Sir Issac Newton said. "If I see further than other men, it is because I stand on the shoulders of giants."

A yacht crying out for further work is JACOBS LADDER (Ian Day and Martin Rayment). It was propelled by up to fifteen flexifoil kites. Better traction kites have been developed since, and better foils too. A beautiful but one-way craft called GAMMA made an appearance at Speedweek for one year only. Did it prove that one-way craft are impractical? We should be told.

Philfly by Philip Hansford,
photo: Roger Lean-Vercoe (we think)

Jacob's Ladder;
Photo from N Hutton Boat Builders, Lymington, UK

CLIFTON FLASHER with its multi sails is one I would like to see again. Where is it? James Labouchere's HYDROSLED worked well before James put it aside to build seaplanes, but it inspired WINDJET (Richard Jenkins), a craft designed to break the land, ice and water speed records.

Philip Hansford's flying hydrofoils DOT, MAYFLY and PHILFLY were universally successful, but who is following them up and building on their successes?

The sad death of Bob Quinton may not be the end of his projects as AYRS have been given access to his many crafts. The task of building a successful triscaph or amaran remains outstanding: Alan Blundel brings his VARI-SCARI to Speedweek regularly, but Jean Hurtado has put aside his HURLAM due to advancing age, and Torix Bennett has returned to multihulls after one episode with amarans. A yacht with inflated wheels for outriggers was built by Neils Haarbosch. The idea was that the wheels would rotate due to water drag as the craft progressed giving drag free outriggers. The smooth wheels did not rotate and the experiment was abandoned. Not so with Tim Glover and Kim Fisher's amphibians, which have subtly-shaped tyres and are definitely NOT stalled projects.

ROCAT, a rowing catamaran by Chris Langton is now in production and the first one has been delivered. Chris Evans built a sailing canoe called SUNSHINE and also a craft called FOILED AGAIN. Any further developments with them?

My favourite is a seaplane called RODA, built and flown by Ron Davis. It was a RIB with a motorised

hangglider fixed atop it which flew over Portland Harbour. His problems are not technical but legal (like it didn't meet the requirements for a Certificate of Airworthiness!) The French produced a fishtail-propelled boat called ONDULO. How did its efficiency compare with rowing? It received one mention in Catalyst, then nothing more was heard. Does anyone know?

Hydrofoils have been fitted to CATAPULT inflatable catamarans by Sir Bob Hill (TOASTRACK) and Arthur Lister. Have they reached the limit of their potential? A neat little experiment that could be built in a small apartment is Nick Povey's stepped twin planning sailboard. Where is it? S. Newman Darby has sailed WINDSPEAR, a sit-upon kayak cum sailboard. He states "it is not on the market but I will happily build to order." Were there any takers? Mr. Darby also built MINI-TRIMARAN III. He says "I would be glad to help any companies if they would want to manufacture the mini-trimarans". It sounds stalled.

At a recent Speedweek Neils Haarbosch sailed FLAXCAT to demonstrate flax-reinforced resin construction, and also SANDRAK, a solid deck catamaran. George and Joddy Chapman built and sailed the foilers BANDERSNATCH, CALIOPE, CERES and a lighter version of CERES called DEMETER. What next? Chris Evans and Richard Varvill have a hydrofoil cat called DADDY LONGLEGS with two steerable bow foils and two main foils. It is permanently based at Portland, but has it sailed? Bob Date's Bristol Mob has its foiler FLASHBACK and Torix Bennett annually brings along large cats called SEA SPIDER. Simon Maguire has a 13 knot dinghy foiler called M4. Any details? Stephen Thorpe's fletner rotor-powered ROTABOAT sailed at recent Speedweeks. Can it be improved with a higher, wider, faster-rotating rotor (on a larger hull) or is it just whimsy?

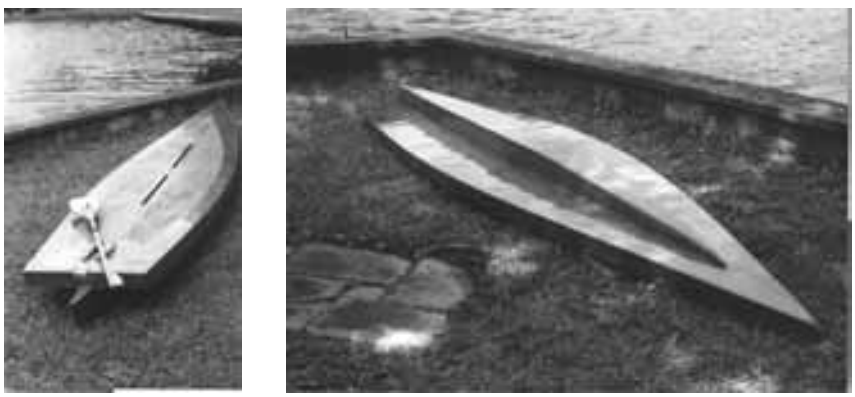
Peter Worsley & Twice Lucky

AYRS's windmill boat expert is Jim Wilkinson, but now retired. Peter Worsley built windmill boats JENSA and TWICE LUCKY. Is there any future for them?

A dart trimaran by Pemberton and others was described as being "in the early stages of testing, towed at Speedweek 2002!" Nothing heard since. Fred Ball has built innumerable kiteboats, multihulls, a circular boat, an over-the-top wingsail craft etc. The John Hogg prize was won by Michael Wingeatt with TRANSCEND, a displacement hull and keel unrestricted by the square root of waterline rule. CHAMPION is a multi hulled slewing catamaran by Denys Teare.

And what about the bits of boats? Jan Alkema won the 2005 John Hogg prize with his upside-down vane self-steering system. Have any more been made? The fact that Fred Ball's and John Perry's hapa's have not yet been used on my windpowered seaplane HAGEDOORN is entirely my fault. Slade Penoyre has developed setting-out gear, self righting gear and yachtbourne wind turbines. Richard Dryden has tested a sloping variable geometry sail (transition rig) on a MIRROR dinghy and plans it for large yachts. Jack Goodman (see below) has built a SMART ANCHOR, M.K. Mitchell a gravity-shift keel and Anibus Janko won a prize in 2000 for a paddle wheel.

Surely many of the above projects deserve to be progressed?



Newman Darby's Windspear (Catalyst 18)

Projects which have NOT made it onto the water

The above projects have at least been built and sailed full size. Not so the following!

As far as (directly) downwind faster than the wind is concerned, all there is to show for all that has been written is Jack Goodman's video. Two weaknesses (1.) it is a model. (A small vehicle may do what a full-scale craft cannot do, the square-cube rule) and (2) it is on land (tarmac has less drag than water).

I wonder whether any of the model craft will ever make it to full size? Alex and Jon Montgomery's full-size Quattrofoil awaits funds, John Thurston has a 4-hulled model craft with five rigid windsails, Giles Whittaker built a hapa-stabilised model and Chris Antcliff an aerodynamic hull in 2008. David Chinery built a model articulated oar. Please may these be built full size, not necessarily by the original people?

Theories abound but will they remain only theories? Mario Rosato wrote about "fishtail raymotion and gondolas". He and Giovanna Barbara posited a disabled people's boat. Peter Jefferson explained what the 80 Knot yacht would need and the AYRS Committee launched the Weymouth 10-6 class, a Speedweek yacht 10 metres long by 6 metres high maximum, but no takers yet.

A step forward from theories is designs. Roger Napier has a hydrofoil-assisted two-way flying proa design. "Designed many years ago, I had hoped to build it, but somehow it never happened. I pass the design onto the membership with my blessing. One of the members could build and race it." A stalled project being asked for someone to get it unstalled.

Peter Rhodes-Dimmer has a canoe- class B sailing canoe project, 17 foot long with boatek wing and asymmetric foil. It was not built by 2000 (unless YOU know better!). Third prize in the Concept Boat Competition was won by Mike Munson with BOXCAT, a transformable workboat. Did it ever see production? A triple challenge called the MICROTRANSAT PROJECT planned to cross the Atlantic in a less than 4 metre long autonomous, unmanned, cheap, sun and windpowered craft in 2008. Did it?

Prior to theories and designs are ideas. There was a call for help by Tom Gleadhall for a Warwick University project on small hydrofoil craft. Did he find anyone out there? Emmanuel Roche promised to bring his biplane kite project to Speedweek 2008. My pleas for help re authoritative kite-lift co-efficients remain unanswered.

Conclusion

Clearly there are innumerable projects out there and there is no need to start from scratch. Just stand on the shoulders of our predecessors and start where they left off. Practical, affordable, non-lethal yacht research is not dead, just sleeping. Send write-ups of your successes, failures and problems to the *Catalyst* Editor. He is not a reporter and can only publish what you send him!

We need more articles on full-size yachtbuilding and less speculation. Remember:

- Catalyst is not "Model Boat World".
- Catalyst is not the Fortean Times of yachting.
- AYRS does not stand for "Are You Really Serious" (thanks Tony Kitson).

Afterthought: AYRS Hall of Shame

In this catalogue of failure, no names will be mentioned in order to protect the guilty. Except me! My HAGEDOORN craft has still barely reached the water but I hope to have something this year. An AYRS committee member has long since proposed commercial cargo ships drawn by enormous kites. Now the German firm Beluga Shipping has launched the 10,000-ton MS BELUGA SKY SAILS. Its £400,000 windsurfer kite is controlled by computer and provides up to 35% of the vessel's power. They plan to build two more kite-driven vessels twice as large as this by 2009. AYRS received no credit.

Other projects by committee members include a garage door towing testbed (will it ever be built?), a 7-metre trimaran (ditto), a yacht named FREE SPIRIT (will it get passed the planning stage?), a class of craft that are true open daysailer racers (were there any takers?) and a trimaran with folding outriggers (plans only?)

I particularly look forward to seeing the projected autogyro boat aimed at the women's absolute speed record. To date we have seen neither theory, maths, plans, models nor ideas written up. Please may we have them.

Remember!

CATALYST NEEDS COPY

Roger Glencross

Chairmans Notes July 2009

Fred Ball

It's already August when I write this and I still haven't completed the repairs to Gwahir, each time I get started the rain clouds roll in, however the Wimbledon hot dry spell at least allowed me to get the main structural work done , just the fairing and making good to do.

On the other hand have managed some sailing and boating events, Broad Horizons was enjoyable , "Fred's Folly" sailing rig this year (confirmed dagger boards too far forward with conventional rig) and on the Sunday briefly leaving the water while launching the kite rig. Two weeks later I revisited Barton Turf to see what the UK Home Boat Building Group were up to, some novel and some immaculate boats were there

The Weymouth May week allowed me to try "Fred's Folly" with new dagger board slots , a great improvement and pleasant sailing as a result. The weather conditions didn't suit kite sailing but in the calm conditions on the Thursday Roger Dyer was able to perform towing trials of his Messenger design dinghy.

Then came the Beale Park Thames Boat Show where AYRS had a stand and probably due to Sheila and Simons help we actually made a profit! There were numerous interesting small boats including a curragh with a "see through" skin of flax sealed with a linseed oil based uv setting resin.

The following week I helped Slade Penoyre who was exhibiting his 3 metre ie quarter scale floating windmill generator at Seawork a commercial boat show, as well as handing out leaflets I was able to tour seagoing tugs, offshore support vessels etc and go for a demonstration run in the Aquaexplore 850 electric launch propelled by a Toquedo ruise 1.0 heavy duty electric outboard run from a large bank of traction batteries located midships giving her excellent displacement performance and range..

At the end of June I was able to crew for Julian my youngest son when he collected his fresh (nth hand) boat from Cowes for the delivery trip to Chichester; slow and steady due to a trailing forest of weed, only to hear two days later when he went to scub her clean she had been broken into and the outboard stolen! The police response was confused and delayed by arguments about "whose patch" as Langstone village where the mooring is, is divided by the county boundary, however the miscreants have been caught and the outboard (and several others) located.

I'm still working on Gwahir when the weather forcast is good and making modifications to "Fred's Folly" kite rig fittings and making some low aspect ratio keels to try out instead of the dagger boards.

I'm going with Margaret on a visit to Shetland to see ponies etc at the end of August.

Don't forget to come and meet members of the committee at Weymouth Speed week (10th-16 October www.speedsailing.com) and at the AYRS meetings October 14th at the Royal Dorset Yacht Club, November 14th (a Saturday) at Thorpe, January 30th (a Saturday) at Thorpe and at our stand at the London Boat Show at Excel 8-18th January.

"Fred's Folly" with its secondhand Laser sail

THE SECOND INTERNATIONAL CONFERENCE ON INNOVATION IN HIGH PERFORMANCE SAILING YACHTS 30 June - 1st July 2010

FIRST ANNOUNCEMENT AND CALL FOR PAPERS

Organised by

The Royal Institution of Naval Architects

IRENAV

CITÉ DE LA VOILE ÉRIC TABARLY

ECOLE NAVALE

Overview

INNOV'SAIL 2010 will build on the success of the 2008 conference to provide an international forum for the presentation and discussion of the latest scientific and technologic research and its application in the complex field of high performance yachts and competitive sailing.

INNOV'SAIL 2010 will provide an opportunity for scientists, architects, engineers, sailors, sail makers and others involved in this fascinating and challenging field to come together to share skills and knowledge.

Papers are invited are all aspects of yacht design, including the following topics:

- Innovative design for performance
- Aerodynamics
- Design of sails, masts, rigging
- Hydrodynamics
- Design of hulls, appendages
- Structure and materials
- Fluid structure interaction
- CFD Validation
- New experimental techniques
- Performance enhancement in general

Submit an abstract/ register your interest

To regsiter your interest for INNOV'SAIL 2010, please contact RINA on Tel: +44 (0) 20 7235 4622 Fax: +44 (0) 207259 5912 or Email: conference@rina.org.uk

The deadline for submission of abstracts is **24th December 2009.**

Download the call for papers from http://www.rina.org.uk/c2/uploads/innov_sail%201st%20cfp2.pdf

The conference will be held in the auditorium of the Cité de la Voile Eric Tabarly in Lorient/Brittany, which opened at the beginning of 2008 and is dedicated to the adventure which is modern sailing, of which Eric Tabarly is an emblem.

The Cité is situated in the heart of the old submarine base which, after its closure in 1997, is being converted into a big nautical project centre called 'Le Nautic de Keroman'. Already, an important builder of multihull sailboats, a manufacturer of carbon masts, the logistical centre of the biggest European boat fittings supplier, and nine offshore racing teams are installed here, next to the Cité de la Voile Eric Tabarly.

For more information about the Cité please see www.citevoile-tabarly.com

Catalyst Calendar

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

January 2010

8th - 17th **London International Boat Show**
EXCEL Exhibition Centre, London Docklands. AYRS will be there, in the North Hall. (Srtand N045R) Helpers are wanted to staff the stand, sell publications and recruit new members. If you would like to help (reward: free ticket!) please contact the Hon Secretary on 01727 862268 or email office@ayrs.org

23rd **All-Day AYRS Meeting**
9.30am-4pm, Thorpe Village Hall, Coldharbour Lane, Thorpe, Surrey TW20 6TE (off A320 between Staines and Chertsey – follow signs to Thorpe Park, then to the village). Details from Fred Ball, tel: +44 1344 843690; email frederick.ball@mypostoffice.co.uk

23rd **AYRS Annual General Meeting**
4pm, Thorpe Village Hall, Coldharbour Lane, Thorpe, Surrey TW20 6TE (as above). Details from the AYRS Hon. Secretary tel: +44 (1727) 862 268; email: secretary@ayrs.org

Note: Items to be considered by the AGM, including nominations for the Committee MUST be received by the AYRS Secretary before 22nd December 2009 (post to AYRS, BCM AYRS, London WC1N 3XX, UK, or email: secretary@ayrs.org)

February 2010

27th **AYRS Southwest UK Area Meeting**
4pm 7 Cross Park Road, Wembury, PL9 0EU near Plymouth. As we did last year, we plan to hold a get-together of people interested in technical developments in sailing or boatbuilding. Wembury is a coastal village a few miles SE from Plymouth. We offer light refreshments at about 16:00, followed by presentations and discussions from about 17:00. We are reliant on at least one or two members coming prepared with some kind of presentation and maybe a few others bringing a few pictures to share, so do bring your pictures as prints or in a PC format such as CD, USB storage device etc. If you have a longer presentation in mind, it might be worth contacting me first so that we can fit it in.
As before, we propose an afternoon stroll for those who would like to join us prior to the evening meeting. This will start at 14:00 but we will try to think of a different route from last year and that may mean a different start point, so phone or email for details to John Perry, 01752 863730 j_perry@btinternet.com (note the underscore in that email address).

April 2010

25th **Beaulieu Boat Jumble**
The National Motor Museum, BEAULIEU, Hampshire, UK. AYRS will be there!

May 2010

10th—15th **Boat trials, Weymouth**
Location to be determined (not Castle Cove this time but somewhere else in Portland Harbour). Contact: Norman Phillips <wnorman.phillips@ntlworld.com>

28th – 31st *Broad Horizons* – AYRS Sailing Meeting
Barton Turf Adventure Centre, Norfolk UK, NR12 8AZ. Contact AYRS Secretary AYRS Secretary, BCM AYRS, London WC1N 3XX, UK; email: office@ayrs.org. Note: All boats limited to 1.2 metre max draft!

28th –31st **UK Home Boat Builders Rally – Norfolk Broads**
Barton Turf Adventure Centre, Norfolk UK NR12 8AZ. Joint with the above. For details see http://uk.groups.yahoo.com/group/uk-hbbr/

June 2010

4th – 6th **Beale Park Boat Show**
Beale Park, Pangbourne near Reading, UK. Open-air boat show with a number of boats available to try on the water. AYRS will be there again, selling publications. Contact: Fred Ball, tel: +44 1344 843690; email frederick.ball@mypostoffice.co.uk

How to find Thorpe Village Hall (AGM venue)

http://www.multimap.com/maps/?lat=51.40823&lon=-0.5285&redCircle=on

For your satnav, the postcode is TW20 8TE

Important Notice - AYRS Annual Report & Accounts

Due to the likely delay in publishing Catalyst 36, the 2008-9 Annual Report & Accounts will be published on the AYRS Website **http://www.ayrs.org**.

The printed copy will be circulated with Catalyst 37 (January 2010) which will most likely not be published until after the AGM.

The Editor tenders his apologies, and if wanted, his resignation.

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

On the Horizon . . .

Split junk sails
More Howard Fund applications
Experimental platforms
More sources and resources: reviews, publications and Internet sites

---

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

Printed by Printflow, London EC1V 7JD