



AMATEUR BOAT BUILDERS' ASSOCIATION

MAY/JUNE '04

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Contact any of these four people for clarification of association activities.

HYDROFOILS-AT THE CUTTING EDGE

On 30th March we were fortunate to have Martin Grimm speaking to us about hydrofoils. Martin is from Austal Sea State Ride Control Systems and a former Defence Naval Architect. We were lucky to get him because it sounds as if he's moving back to the East very shortly.

Martin had a well prepared talk for us with a systematic coverage of such topics as History, Applications, Attributes, Design Considerations, Stability and so on.

In the first department it seems the first powered hydrofoil was developed by one, Enrico Forlanini in 1905-06. Back then he achieved no less than 37 knots with a boat running on ladder foils which climbed out of the water as speed rose until the vessel was planing on the lowest and smallest foils. That seems awfully fast to me; one wonders what the world water speed record was at that time. As far as I can tell from the limited resources of my home library, it must have been much lower than this

at that time. And when A G Bell, with Casey Baldwin, set a new record of 61.6 knots in 1919 it must have been an absolute record at the time. It remained as a hydrofoil record until the 1960's. Martin had quite a few old pictures to screen for us of hydrofoils of various sizes including Hans von Schertel's efforts from 1927 on, the German tank carrier, VS8, of WW2 (never operational), a fast ferry (Suprano PT10) on Lake Maggiore in 1953 up to larger US developments in the 60's to 80's.

For the application of hydrofoils, Martin was able to illustrate many uses, including Naval patrol boats, Police and Customs launches, passenger ferries and even oil rig crew support vessels. Even under recreation the applications were broad, ranging from the commercial US Dynafoil through kits to convert dinghies and the commercial Yamaha OU32. Sailing was not forgotten with pictures of the early, largish "Monitor" reaching on ladder foils, the smaller but similar "Mayfly" which was very successful

in its class at several Weymouth Speed Trials, and the foil-borne Tornado, "Icarus". Locally we had the Pivac-designed and Burvill-built "Spitfire 12" originally intended for the Gladstone race and which so far has reached 30 knots (est. max of 40 knots) and a clutch of foil-borne International Moths, a far cry from the Redwings scows I used to race. (apparently the good guys can keep these things foil borne even while tacking).

It seems that hydrofoils have many advantages, mostly stemming from their low wetted surface area. These include a reduced power need, the ability to maintain a sustained high speed in rough water, good seakeeping, economic high speed operation and low wave-making. This latter was clearly evident from several photos. As a measure of transport efficiency Martin offered the formula:

number of seats (or weight of cargo) x speed / power. Thus a high power figure leads to a lower coefficient of efficiency, a high speed figure indicates a higher coefficient.

Design considerations include the final speed - will it be fast enough? How will the resistance of the underwater components affect this? How will we design the foils for cavitation-free operation? On the subject of cavitation, three types were identified: face, back sheet and bubble. Face means on the under side of the foil, back sheet applies to the top and bubble means basically top and bottom. In a hydrofoil it is essential to keep everything light because it all has to be carried by small foils. In fact there's a law of diminishing returns on size and weight of hydrofoil vessels because of the interplay of the square and cube rules which we won't detail here, but it seems the top weight for practical foil-borne is about 465 tonnes and most are much smaller than this. And a sometime-overlooked design criterium is the depth of water available for operation should always exceed the

full, hull-borne draft of the foils; you never know when the boat is going to have to slow down!

Also under design consideration there's stability although almost any hydrofoil, planing, will be more stable than a displacement monohull. Ladder foils offer automatic stability in all three planes - roll, pitch and heave while surface-piercing "V" foils are very good on roll, behaving, as they do, like the dihedralled wings of an aircraft; in fact, better than an aircraft because in rising out of the water the effective "wing" area is reduced in just the right place. The pitching plane is also controlled by the chosen immersion depth of the foils.

The working angle of incidence of the main load-bearing foils is often adjustable and is generally built on the designs of Christopher Hook. The simplest involves surface skimming sensor foils carried ahead of the craft. If a wave approaches both sensors rise and lead to an increase in incidence of the main foils and lift the boat. If it rolls it happens on one side only and corrects the roll. Boeing have developed a more sophisticated form of electronic computer control for same effect. These will lead to pitching, especially in some wave conditions and so most larger vessels rely on fixed foils and the ability to simply clear waves and run level. Moth yachts often control foil angles with a gadget utilising a Morse cable trailed over the bow somehow, plus a twist-grip control on the tiller giving some trim control over a small foil at the tip of the rudder.

All in all the evening was a fascinating insight into the history and design considerations revolving around hydrofoil design and application. It was great that we could hear Martin on this subject and we were very fortunate to be able to get him to the meeting. Once again, many thanks to him.

PRESERVING THE PAST

Martin's high-tech talk lead to the opposite approach - we visited Bill Leonard's Maritime Museum preservation workshop in Slip St, Freeo for the toolbox visit on 10th April. Unfortunately, no physical work was currently under way on any of the six boats present due to lack of finances and the fact that, when preserved, the museum would have no room for public display, as any visitor to the New Maritime Museum would realise. Instead, they will be returned to storage facilities the museum has in Blinco and Montreal Sts, Fremantle. (Apparently there are quite a few more boats in storage there and Bill has offered to show us inside as a future Toolbox visit; something to look forward to.)

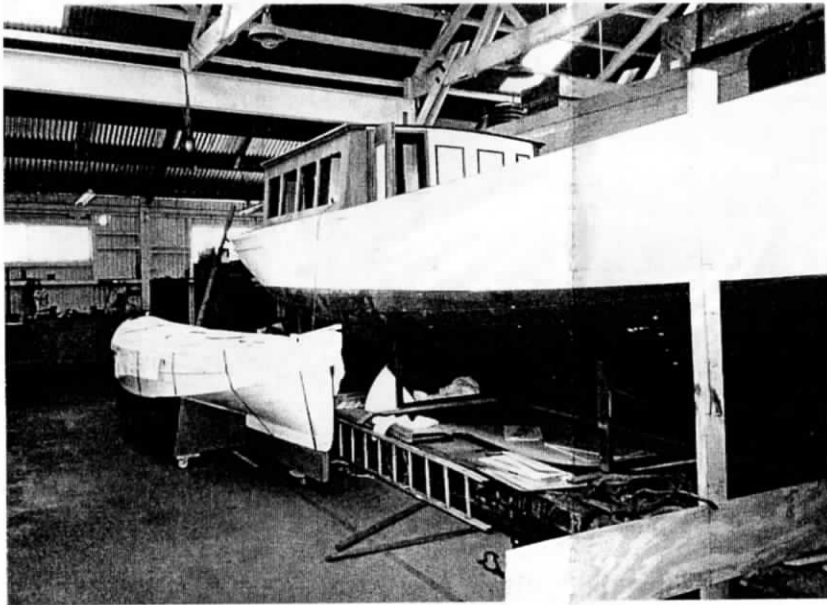
Bill, himself, is currently busy, however, because part of the museum's role is to record the lines of all the boats it currently owns and it's an enormous job, firstly to take off the lines of a boat and then to create detailed construction drawings. Bill's present project is to complete full drawings of the Broome pearling lugger, "Trixen", currently on display after having been restored by Bill and a team before the museum was opened. The drawings have already occupied him for some months and aren't finished yet. Bill was able to demonstrate the taking off of lines using the joggle stick method, against the hull of the steam launch, Ti-Tu, built for the state's Chief Justice, Septimus Burt, about the turn of the previous century. Also to have their lines taken are the builder's half-models of which the museum has a large number. These are taken off while on a bench, using a vertically mounted pantograph rather than miniature joggle sticks, by an offsider, working part-time.

At the outset of our visit Bill spent some time explaining the museum's role in preservation. For a start, in most cases, an artifact must have a traceable provenance; in other words, be of some known importance for the museum to

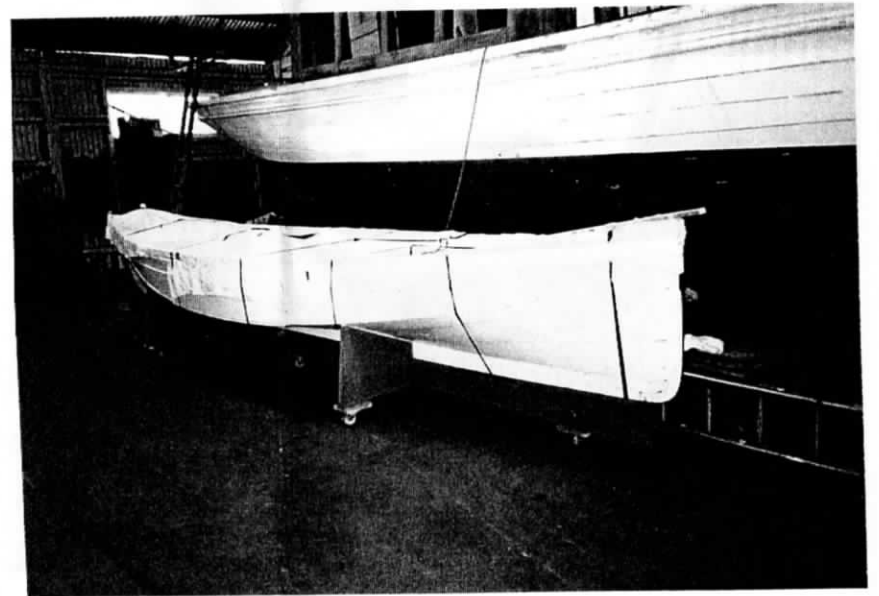
contemplate taking responsibility for it. Restoration, when attempted, usually removes some history from the artifact/vessel, so it has to be done with care and sympathy. For this reason many boats are simply preserved rather than restored. I gather that most of the boats stored at Blinco St qualify as "preserved" or are about to be. To meet this standard any rot has to be halted and a decent cradle has to be provided to preserve the vessel's shape. Bill has built LOTS of cradles in recent years. Restoration, on the other hand, involves rebuilding to the extent that the vessel is representative of when it was new or at some time during its life. The banana surf boat, for example, was sheathed in fibreglass some time in its later career. Most of this has already been stripped off (without too much shedding of tears), but no timber will be replaced unless it is absolutely necessary. The aim is to keep the fabric as original as possible, even if that means it won't float. This is where the backyard restorer differs from the museum.

Perhaps the most interesting, and certainly largest, boat in the shed was Septimus Burt's steam launch, "Ti-Tu". Although built locally, this looks extremely English, approximating as it does to about 1900. The original engine lies as a boat anchor somewhere and is quite unrestorable and the apparent boiler is only a dummy, perched too far forward at the moment. But fitted with a canvas awning forward of the cabin it could pass for "just launched". The launch was built for Burt as a copy of C Y O'Connor's "Cygnet" which the latter had had built in England and shipped out about 1902. Beside Ti-Tu was an equally interesting, hard chine, Cocos-Keeling whaleboat designed by one of the Clunies-Ross clan (the "royal family" of that island group at one time). It's a bit short for chasing whales and probably served to ferry supplies from visiting ships to the islands. It's a great shame that there's now no room for it in the museum's Indian Ocean display, where it belongs. Also of interest, hanging from the roof,

AN HISTORIC WORKPLACE AND CONTENTS



Side by side; S.L. Ti-Tu and the Cocos-Keeling whaleboat. Note the hard chine of the latter.



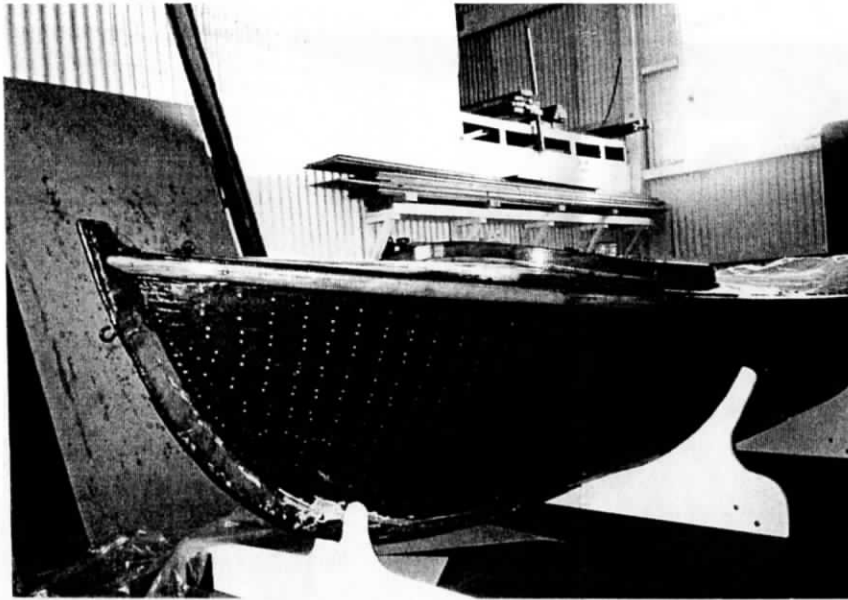
The Cocos-Keeling whaleboat on its stand. Unfortunately, dust covers obscured the inside.



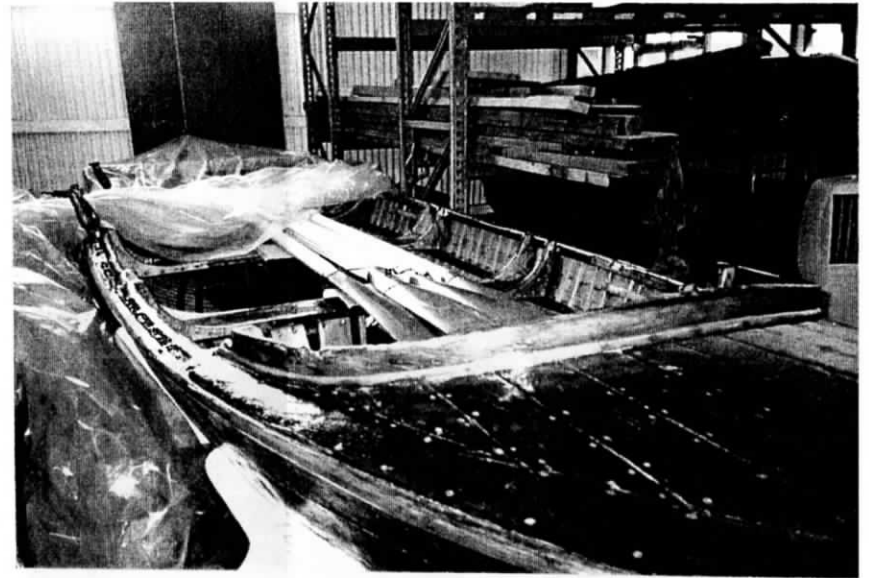
The Edwardian cabin and counter stern of Ti-Tu. That's style!



A rowing tub pair hangs over a pretty but un-provenanced sailing dinghy.



The "banana" surfboat of the late '40s.
Plank on rib construction must have been heavy.



Inside the surfboat, dust cover pulled back.
Monstrous rowlocks on starboard side.



Tucked away: a Cadet dinghy, belonging
to Bill himself, awaits attention.



Another dinghy in a castor-wheeled, steel cradle.

was a rowing club's "tub pair" of about 1960, used for training oarsmen with below it an unprovenanced sailing dinghy. Again below that lay a Cadet class dinghy and adjacent to all those was the banana surfboat already referred to. It's a double ended boat preceding the tuck-sterned boats which came in in the 1950's. This boat has had some restoration commenced, beginning with the removal of the fibreglass but still has a fair way to go. Note the monstrous rowlocks on one side!

Naturally we look forward to a visit to Blinco St sometime, where there are many more boats, including Swan River racing yachts and speedboats. Many thanks, Bill, for allowing us to see your projects and treasures, and particularly for making the effort to open up for us on a holiday, Easter Saturday, no less. It was a most enjoyable visit.

ADMINISTRATION NOTES

FINANCES

At the time of the change to meeting at RPYC Junior clubrooms we mentioned that memberships might be raised to meet the increased cost to us of \$50 per night meeting, but we decided to press on and see how things went for a year. That we did, and things are still holding OK, just. We may have to broach the sum of \$1200 which we have in term deposit, but that's earning almost no interest and we have no other plans for it, so we think that's in order. We'll keep you posted.

FORTHCOMING EVENTS

Tuesday, 25 May: Evening Meeting.

David Lugg, a naval architect, will examine hydro foils for us yet again, but this time from the point of view of a recreational dinghy sailor. David is a keen competitor in the 14' dinghy (or skiff) class which is now identical, he tells me, to the International 14 rule. Of late the class has been subjected to a limit of one foil only, which can be placed any where. Now one foil can't really provide both lift and stability but 14's still find distinct advantages, even with only one foil. Come along and find out how.

Saturday, 5 June. Toolbox Visit.

To Harry Speight's workshop at Lot 4, (No. 308), Hedges Rd, Hovea. Harry has made significant progress on his Farrier F82, folding

trimaran since we last visited him two years ago. Then he had two amahs strip-planked up and the starboard half of the hull nearly so. He's long finished that stage now, and having finally sourced suitable hingeing hardware in the states, he's assembling the whole shooting match. Come along and check out the progress. It's a steep, twisty drive with the house out of sight of the road, but the letter box carries the lot number and the Speight name. Approach only from the west!

LIBRARY

No new books in the plans at the moment, but Geoff will print off copies of an updated library data base to be available on 25 May, to make it easier for members to find out what's available in the absence of the complete set of books themselves.

CALENDAR

Tuesday, 25 May, Evening Meeting at RPYC Junior Club, 7.30 for 8pm.

David Lugg on foils for sailing dinghies.

Saturday, 5 June, 2 - 5pm, Toolbox Visit to Harry Speight (folding trimaran). Lot 4, hedges Rd, Hovea.

Tuesday, 15 June, Committee Meeting.