



AMATEUR BOAT BUILDERS' ASSOCIATION

May/June 08



Robin Hicks exercises in his Herreschoff skiff at the East Perth Wooden Boat Show

PLASTICS ALL THE WAY – A TRAINING FORUM

On Wednesday, 26th March we were addressed by Charlie Urwin of Fibreglass and Resin Sales on the use of resins for both moulding and glueing in boat building. Charlie had done a great deal of homework before hand, preparing twenty sets of information packs which we were all able to take away at the end. The pack included sets of notes on moulding in polyester, gelcoat repairs, catalyst ratios, WEST system epoxies and Technigluue adhesives (for which F&R are agents) and fabric properties, covering fibreglass, carbon and aramid (ie, Kevlar) materials. In addition there were commercial leaflets on WEST System (3) and Technigluue, so we brought away plenty of reading!

Charlie chose not to simply talk about his information kit (an easy option), but starting

from basics, to go through all the ins and outs of using resins generally. He confessed that his original grounding was in aviation, not boating, being licensed to work on metal, wood and composite airframes. Since aviation's standards are, of necessity, higher than boating's, we couldn't see much of a problem there. He first went into the basic differences between polyester/vinylester and epoxy resins. It turns out that with the former two the hardener is already mixed with the resin but won't start to work until a catalyst such as Methyl Ethyl Ketone Peroxide (MEKP) is added in precise, small quantities. In general "small" means about 1% but as a graph in the notes shows, this can vary a little, from about .8% to 1.5%. Too much and you get shrinkage, often violent, even destructive, while too little and the reaction doesn't

complete. Charlie did point out that vinyl ester is more resistant to attack by barnacles, osmosis, etc, a useful tip.

With epoxy resins it was explained that no catalyst is involved – the resin and the hardener (a substantial quantity this time) are directly mixed and reaction starts after a certain amount of working time or “pot life”. As it happens, the mix ratio can be very critical (+ or - .25% for a Boeing aircraft wing repair). The resin/hardener ratios set by the manufacturer are usually, but not always, whole numbers such as 1:1 (Araldite), 2:1, 3:1 or 5:1 (most WEST systems). To control pot life somewhat in varying temperatures some manufacturers (notably WEST) market one or two hardeners, Slow and Fast, and in our summers one will almost invariably want Slow, to achieve a useful working time but beyond that, temperature control of the mix is called for. On big jobs, in summer, a two-bowl ice jacket (such as a pair of icecream containers) is one way to keep the pot temperature reasonable. It’s worth mentioning here that containers that allow a large surface area for cooling help, too. Say, half a litre of mix in a 2 litre icecream container is about the limit. This is because the chemical reaction gives off heat itself and can aggravate the situation a lot. Tall, narrow containers are not wise at all. On the other hand, your editor usually warms 24 hour Araldite while mixing to speed up the reaction. This shortens cure time from 24 hours to about 6, but it’s easy to overdo things!

Traditionally, all chemicals were supposed to be mixed by weight, and Charlie pointed out that the investment of \$70 in a good set of electronic scales could avoid the discarding of hundreds of dollars’ worth of incorrectly mixed resin. That said, some manufacturers (including WEST) do provide mixing pumps so that volume methods can be employed, because the volume and weights are consistent enough. However, when left to stand between uses the pumps can collect air bubbles mucking up the next mix, so purging of the pumps is called for on second and

subsequent uses. Me? I’d just use electronic scales and weigh the stuff.

Very careful mixing is always necessary – it can take four or five minutes in winter, stirring both the middle and around the edges of the pot. And watch the temperature; a ten degree increase will halve the pot life.

As a glue WEST resin is mixed either with micro-balloons or, for greater strength, with micro-fibres. Either should be mixed into the hardened mix until the desired level of mobility is reached. A small quantity of thixotropic agent can be added, particularly with micro-balloons, so that the mix doesn’t go all runny ten minutes after you’ve finished. This is particularly desirable if using a mix for filleting and so on. Techniglu, as the name implies, comes ready to glue without all of the aforementioned additives. (except for hardener, of course)

For sheathing Charlie had quite a few samples of glass, carbon, Kevlar and composite cloths to show around – unidirectional, bi-axial, etc, etc. Chopped strand glass matt has size to hold it together and the size doesn’t wet out to clear when used with epoxy, so CSM is best kept for polyester resins in moulded applications. ‘Glass cloth wets out fine with epoxy and this tells you when you’re doing the job right, but carbon and Kevlar don’t give such an indication and it may be necessary to lift a corner of the cloth after wetting out to check that the resin has gone all the way through. To get best adhesion it’s best to apply resin as soon as possible after sanding or otherwise machining the timber before the grain can close up again. For second and later coats, especially with epoxy, a bloom may have settled on the surface. There are three ways to defeat this. Firstly, apply the second coat while the first is still uncured, secondly scrub with detergent and a pot scourer or light sandpaper (difficult if the surface is indented over the cloth) or thirdly, use peel ply. PP is a fine weave cloth laid over the job and peeled off after hardening has taken place. This lifts off the excess resin along with any bloom and leaves a suitably roughened surface for the next coat – easy!

Resin ratios vary between CSM and woven cloth. With CSM expect to use 1.5kg of resin to 1kg of CSM; with woven cloth 1:1 is normal. Polyester resins will keep on the shelf only 3 or 4 months while most epoxies keep for several years. Safety is an issue with epoxies which are an accumulative poison. Once you get enough in your body (and through the skin will do it), that's it, no more or you get all kinds of allergic reactions - forever. Consequently the stuff should be used with masks and gloves at all times. Acetone, used for cleaning, is explosive too, so good ventilation is called for. Material Safety Data sheets should also be consulted before starting.

Epoxy resins are not UV stable in themselves, and pigmenting doesn't help, so it's best to paint over them. Failing that, WEST's 207 hardener helps as does using a polyurethane varnish which has as much UV filtering as possible. Charlie suggested at least two coats of 2-pack polyurethane over the resin.

Charlie also had samples of core materials such as Divinycell and end-grain balsa, with comments, but that about covers the bulk of his talk. As you can tell, it was extremely comprehensive and we are very grateful that he could attend and talk to us. Many thanks indeed, Charlie, it was a most informative evening.

EAST PERTH WOODEN BOAT SHOW

As advertised in the last newsletter, this event was held at Claisebrook Cove on Sunday, 30th March. It was conducted by the Perth City Council and held over from late October to this date. Unfortunately the PCC had not budgeted fully for the event, either for publicity or for marquees, etc, so it was a bit of a rush job, especially for us. The result was very few exhibitors, either from ABBA or elsewhere, which was a pity especially considering the brilliant weather.



On the south bank there was an excellent display by the MHA and Brian Lemon (models) together with Brian Phillips' Wooden Boat School and Tangee Publishing. On the north bank hardstanding there were only three boats and a display of engines including outboards collected by Mike Williams and Bruce Guppy and Doug Baker's display of his own-built compound steam launch engine, still not quite finished together

with four model steam engines of various types as well.

On the water there were several classic launches, although sadly, not the Coys'. They'd started well enough but had to turn back with water pump troubles. Mike Igglesden had "Oriel" on the water; "Hughie's Girl", an attractive yacht by Brian Phillips was also there as was Wally Cox's well tried "Karina".



There was also Paul Thompson's "Dragon Gilt" runabout and canoe and a beautifully varnished mahogany runabout which we saw last time. Robin Hicks could frequently be seen rowing around and sailing in his 1902-Herreshoff design as modified by Joel White, "Columbia".

Perhaps the most mysterious was a small, double-ended rowing boat looking as if it had just come from a beach in the Greek islands – no information on this one at all.



That's an idea for the organisers – ask all exhibitors to provide an information display sheet with their exhibit; some did, many didn't.

Back on the hardstanding the boats were Jay Niven's "Rascal" (now finished, we had a toolbox visit there earlier).



Richard Ayton's Joel White/Herreshoff 12 ½, was towed all the way from Boyanup.



The Harry Hammond-built (1957), ex Col Joye traditional clinker skiff runabout is in the middle of an engine changeover. This latter had an excellent information display but failed to mention the current exhibitor! In a bit of a rush at the end we printed 150 leaflets advertising ABBA and about half of these were taken, so we may recruit some new members and may reduce the cost of the marquee.

The weather was marvellous and it was a good boat show but it could have been so much better if adequate time had been allotted to recruiting exhibitors.

A RETURN TO THE SWARBRICKS

Saturday, April 12 saw us return to Swarbrick and Swarbrick Yachts in Henderson for a second, well attended toolbox visit. We were greeted by Glen Swarbrick himself, who was just in the process of setting up a large, computer controlled routing machine sort of thing to shape up a block of polystyrene foam which would become part of the plug for a 9m runabout. The foam block measured about 1m square by 2m long and shuttled backwards and forwards beneath the high speed cutter which removed polystyrene foam effortlessly in about 3cm cuts. It was computer controlled to produce the shape of the boat, less 7mm to allow for a later coating

of high density polyurethane. (polyurethane does not dissolve under fibreglass resins, whereas polystyrene does) When all the individual 2m sections are finished, including hand sanding with 240 grit paper, they are glued together to create the 9m plug. A female mould is then made in fibreglass and production of boats can begin. Using the same gear it is possible to machine a female plug or mould in foam for a one-off hull, too.

The mould we were most interested in was the venerable S&S 34 one, dating to 1967, which has seen more than 160 boats produced, and it's still going strong. As Glen

explained, the life of the mould depends on how it's looked after between uses, and how well it's prepared for each use. I don't think the moulds one sees lying around in the weather outside some factories would last a fraction of 41 years.



The most recent boat to come out of this mould, including deck, was standing beside it, the deck just awaiting fastening down. As Glen explained, the hull, in common with all recent ones, is a vacuum-bagged, foam-cored construction using vinylester resin.

Vinylester is a more flexible resin than poly, and less likely to crack, and is not subject to osmosis. It costs about \$4kg more but that's not much against the finished cost of the yacht. Foam core sandwich gives a much stiffer hull for less weight and vacuum-bagging allows perfect wetting out for minimum resin. As mixed, the resin has about 90 minutes working time which is just enough to get the resin through all the hull, using about twelve inlet holes per side. Should the resin start to gel prematurely infusion can be initiated from other points to complete the job. The vacuum bag itself is made as a one-off using pale green bagging film which is not as porous as ordinary poly film. It's stuck down where needed using a thick, black, double-sided tape. The vacuum can be relaxed after 12 hours and curing is complete after 25 – 30 hours. The overall result is a hull 300kg lighter than the traditional one and most of this goes into extra ballast. The present ballast ratio is 51%, which is excellent by any standards.

The S&S 34 is still an old-fashioned boat with its beamy midsection and fine ends but it makes an excellent cruising yacht, still with the ability to beat more modern Benetteaus, etc, to windward although it has to give ground downwind. The fact that it's still selling, at around \$300,000, nearly half a century after its inception, is clear testament to its longevity.



Also of interest was a wooden pattern for an updated S&S fin, nearing completion, although this was still not the modern fin and bob form. When complete it will go to a foundry for casting in cast iron or lead. There was also a long, stilleto-like surf ski, (an Epic, reputedly the best design available) beside the moulds for a Swarbrick equivalent for comparison.



And then there was a pair of older launches, apparently in for modifications to their stern areas. The larger was an inboard vessel with a climb-through transom for swimmers, most likely, and the smaller, an outboard boat with the transom being completely remodelled, probably for a new motor.

So Glen continues to have a wide variety of work on the go and we are indebted to him for allowing us to see the works in action. Many thanks, Glen.

ADMINISTRATION NOTES

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MAY TECHNICAL MEETING

This evening will be on Wednesday, 28 May, at the usual place, SofPYC Committee Room, 7.30 for 8pm start. The speaker will be long-time spar and oar maker, Ray Miller, who hasn't addressed us for some years and I'm sure many new members will appreciate the opportunity to hear him. Ray is a meticulous craftsman and I'm sure we'll all learn a lot. Don't forget the evening meal if you're so inclined.

JUNE TOOLBOX VISIT

It's been difficult to arrange this because the intended host, Steve Handley, is in the middle of a change of projects, but at the time of going to press, things look pretty definite, so we'll go ahead. Steve is a wooden boat builder at 4 Mews Rd, Fremantle – just beside Freedom Marine. Until recently he had the

old launch, "Kiewa" in for a partial rebuild but she's since been moved to Wanneroo and it seems likely that Steve will have another old boat in as an insurance job by the time we call on Saturday, 14 June, between 2 and 4pm. If anything should occur to change this plan I'll contact people by email and letter.

NEED A NEW PROJECT?

Sighted in The Quokka for 8 May – TENDER FOR PURCHASE AND REMOVAL OF 10 METRE WOODEN VESSEL – SANTA BARBARA, Tender No. 2037/08. Contact Kerry Stephens at the Department for Planning and Infrastructure on 9216 8889 or download from www.gem.wa.gov.au Closing date and time: Wednesday 21 May at 2.30pm in Perth, WA. Sorry, no other information available, and you haven't got long!



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