



AMATEUR BOAT BUILDERS' ASSOCIATION

August September 2014

TO MAKE A SAIL — A TRADITIONAL SAIL

Our presenter for this Technical meeting was Pete Ripley. Pete trained as a traditional sailmaker in the UK before branching out into big boat rigging and, until recently, operations management for WA's tall ship, Leeuwin II. However, he has to earn a living, so he also applies his skills to the management of industrial heavy lifting projects and (more recently) to the development of an innovative exhibition marquee design. You'd think that this would be enough for one person, but no! Pete also makes sails for many of Australia's tall ships. This was the subject of his presentation; tall ship sail making; tools, methods and materials, traditional and modern.



The presentation commenced with Peter explaining some of his background and how he came to arrive at this career. He commenced by pointing out that having been born in 1970, he found himself with the advantage of being able to see many of the old ways disappearing as the new ways came on the scene in this industry. He quickly found, through work experience in an office environment, that the indoors was not for him and the alternative of being 'chucked' into a sail loft (as he put it) was much more to his liking. In this environment, he gained experience with the Alan Bond team through the period of the America's Cup defence activity in Fremantle in 1987. Here he learnt of more modern sail making techniques and funding required to support such adventures! He noted that these boats had a set of sails for practice and a set of sails for the

serious racing. The racing sails generally lasted only three races before they were suitable for salvage only and a new set had to be made to replace them. His other activities in these earlier years included the Pelican Point Sea Scouts, which he remains associated with and several years at sea as a watch leader on the Leeuwin II. Pete then realized that if he was to seriously pursue traditional sail making, he would need to go abroad to learn the trade. He ventured to England where he joined the James Laurence loft in Essex. Here he found that there was a lot more money in Europe to support traditional sail making with its associated high content of expensive hand sewing. The industry was buoyant and the traditional skills very much still available for him to learn. He compared this with Australia where a high proportion of the demand for traditional sails comes from a small number of 'not for profit' entities such as sail training organizations which have very limited funds.

After three years at James Laurence, he received a call from Chris Blake, the master of the, about to be launched, Endeavour replica. Pete returned to Perth to complete the sails and rigging of the Endeavour. He related how construction of the standing rigging using polyester was well advanced when it became apparent through experience that the stretch in the polyester rope required constant tightening. It appeared that this constant tensioning of the rig would ultimately put too much stress on the mast. Over a period of only two months leading up to the maiden voyage, the entire rig was replaced with manila.



A few years later, Pete made a further 15 sails for the Endeavour and this was followed by 21 sails for the James Craig. In the late 1990's the Duyfken was also launched in Fremantle and Pete has made sails for her and then there was the Leeuwin II as well. More recently he made sails for the British sail training for the disabled vessel, the Lord Nelson, when she visited Australia. So over a number of years, Peter has established himself as a very capable traditional sail maker, well known by those who need to know and sought out by many traditional ship owners across Australia.

We clearly had the right man for this presentation so let the presentation begin!

Pete divided his talk into segments focused on the key elements to the trade such as sail cloth materials, ropes, sewing threads and sewing machines as well the techniques for designing, constructing and repairing traditional sails.

Sail Cloth

Normal sewn sails are made from Dacron but this is too hard for sails on traditional vessels which are manually handled much more than on modern yachts. Traditional vessels generally use Duradon, a polyester material that is softer than normal Dacron sail cloth but is still light in weight relative to other materials and is water resistant. However, these sails are large and in

one piece are not light weight. Pete gave an example of a square sail on the James Craig which is 21 metres wide and 12 metres high and weighs 170 Kg.



Other alternatives are cotton and flax. The sails on the 'J' boats are still made from Egyptian cotton. This is fragile to make and requires a lot of care and attention in use to avoid very fast deterioration. Flax sails are easier to make but absorb water to three times their weight and also rot very easily, but are the choice for very traditional vessels such as the Duyfken. Notwithstanding, if flax sails are well looked after they may last up to eight years whereas if they are regularly left wet they may not last more than a few months.

All of these cloths suffer in the UV but this can be managed by use of a 'sun cloth' which is stitched to one side of the square sail and rolls over the top of the sail to protect it once it is furled on the yard. This prevents the sails becoming 3DL – three days left!



Another aspect to consider is the weight of the cloth. There are several different standards by which the weight of sail cloth is rated. The oldest system is the RN or Royal Naval system which is 200 to 300 years old. Cloth will be denoted RN4, 6 or 8 etc with the largest number being the lightest weight. Alternatively, the sail maker's ounce is a system only 150 years old. A sail maker's ounce is the weight of fabric 28.5 inches wide and 36 inches long. Sail maker's ounces are also known as US ounces. Cloth may also be measured in ounces per square yard known as UK ounces, (the flax used on Duyfken is 18 UK oz). Finally, there is the Dernier system which measures yarn weight. One Dernier is equal to the weight of 9000 metres of silk worm yarn measured in grams. By way of example, stockings are 10 Dernier, leggings 200 Dernier and backpacks 1000 Dernier.

On the bolt, sail cloth is usually 54 inches wide and has a 'warp' that runs with the roll and a 'weft' that runs across the roll. Cloth is available with equal warp and weft or various ratios of unequal warp and weft. Generally, the square sails on traditional vessels are made with equal warp and weft but unequal warp and weft material is used to advantage on to enhance the shape on racing sails.

Sail Design

Selection of the appropriate sail cloth varies with the type of sail of traditional vessels. Generally, the square sails are made from Duradon which is softer on finger nails when furling and the fore and aft sails are made from Dacron. In the case of exceptionally traditional vessels such as the Duyfken, the sails are made from Flax. There is only one world supplier of Flax and often there are small defects in the material off the roll so a thorough check of the stock before commencing manufacture is essential.



Square sails are made flat and generally not shaped. The panels run vertically so that the maximum load (vertical load) is on the panels and not on the stitching. Attention needs to be given to provisioning for load transfer at the corners of the sail and along the edges. Various designs of clew patch – multiple thicknesses of sail cloth tapering out to the single layer of the body of the sail - are used in the corners. A Rutgerson eye (worth looking at www.rutgerson.se) or a brass ring sewn around with a brass ferule swaged inside is then used to attach the rig to the sail corner. Bolt ropes may be one of three alternatives used widely on traditional vessels. Hemp and manila are natural fibres which have been around since the heyday of such craft. The modern, look alike, equivalent is Roblon which is made from a polyester fibre.



Pete also outlined two other features which are often designed into square sails. A strengthening middle panel of sail cloth running from bolt rope to bolt rope prevents any tears in the sail from going further than halfway down the height of the sail. The other feature is a bunt cloth on the fore side of the sail containing eyelets to accommodate a 'bunt line'. This is used for furling the sail without going aloft. The Lord Nelson has 8 bunt lines per sail.

Sail Threads

If you are contemplating machine sewing on traditional sail cloth you will need to use a three stranded UV stabilized bonded polyester thread. Pete uses Coats Dabond which comes in a range of thicknesses denoted by V207 to V69 and is about \$35 for 2 Km. For hand sewing on flax one

needs to use flax thread which needs to be handled with care as it can break very easily. Prevention can be assisted by waxing the thread as one goes. Other threads used for hand sewing the more modern materials include Dacron V462 and Solafix PTFE 2700 Denier thread for sewing such things as Dacron shade sails. Pete noted that in the old days, the strength of sails was important with respect to 'staging' potential breakages. The top gallant was made so that it was the weakest and therefore the first area of the rig to break in a storm. These days, the whole rig is very strong and catastrophic failure occurs wherein the whole rig fails.

Tools and Fittings

Pete passed around a number of essential tools used by a traditional sailmaker including good quality Wiss scissors, the smooth handle of which is also used for rubbing down seams. A sailmakers palm and a traditional oiled Egyptian cow leather FID as well as a heavy mallet and a 'T' bar thread tightener were also in his collection.



Notable in the fittings department was the clew iron, a large fabricated stainless steel frame that is sewn into the clew of sails too large for normal Rutgerson eyes or brass ferule type eyelets mentioned earlier.

And then of course there is the essential piece of equipment - the sewing machine.

Pete had some good and some bad stories to tell but we will keep them for another day. He has and still uses some of the following; Singer 132 which does straight stitch only, Bernina 217, Adler 166 and an Australian made Cordes.



Here Pete gave us some practical advice about tension setting for these machines with particular reference to the bobbin. The tension on the bobbin spool should be set so that if one holds the bobbin vertically on the end of the thread, the bobbin should just fall under its own weight.

Pete finished with a short explanation on software available for sail design tasks. Mention was made of Sailcut, a free computer software package which he has used in some of his work.

ABBA thanks Pete Ripley for a very informative evening and some very valuable practical tips for those of us who aspire to do some of our own canvas and perhaps sail making work. – thanks Pete.

SEPTEMBER TOOLBOX VISIT – ED ESSERS MAJOR PROJECT

The September Toolbox was a return visit to member Ed Essers project as it takes shape at his purpose built shed just out of Armadale.

Your editor is going to take some license here and repeat some of the salient details of Ed's project which have been recorded in previous newsletters. Please refer to the newsletter for November December 2012 and November December 2013 for all the background details to this major project. The new material recorded here will be an update on Ed's progress since our last visit in November 2013.

Ed has now commenced actual construction of his 14m Mobjack design Herreshoff Ketch. The vital measurements of this vessel are 13.812 metres over the deck, 3.828 metres beam and 1.686 metres draft. The original design was in wood but Ed has made the design changes needed to construct it using aluminium plate which will be welded with a MIG machine capable of using between 1.2 and 1.6mm welding wire. The aluminium is of varying thicknesses – 16mm for the bottom, 10mm for the keel box construction, 8mm for the frames, 6mm for the stringers and for the skin plating. The aluminium is Alcoa Nautic 5083 and 6082.



During this most recent visit we were also able to see the now complete tender for the Mobjack which Ed was working on during our last visit. This is a Catspaw dinghy built from plans obtained from the Wooden Boat Store. The Catspaw is a Joel White interpretation of Nat Herreshoff's classic Columbia Dinghy. She is 12' 8¹⁵/₁₆" long with a beam of 4' 5³/₈" and is designed for oar and sail... and in Ed's case sculling as well. The Catspaw has a housing type centreplate with a lead insert to assist stability.

Ed has used red oak extensively for the stem, keel, transom and the ribs. The lapstrake planks are 6mm hoop pine ply. At the time of our last visit, the stem, keel, transom and ribs were completed over a temporary building frame and the first of the planks at the keel close to being finally fitted. The Catspaw is now complete, painted and with beautifully clear finished oars and oregan mast in place and ready to go. It was very easy to see how this classic dinghy will very ably complement the traditional lines of the Herreshoff Mobjack when both projects hit the water.



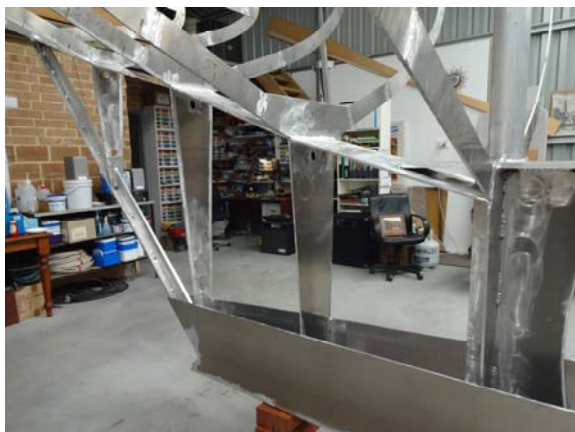
There has been great progress on the major project since we last visited. The frames are now erected on the keel box section and the stem and stern post in place. All the frames are notched out ready to take the stringers. Ed has trial fitted the first stringer and found that the angles that the stringers take to each frame will require further work to get the notch depths correct. He is using a hand power saw with counter rotating blades to do all the aluminium cutting – very successfully it would appear. The stringers will be fitted along the topsides and down the hull but work will momentarily cease somewhere above the keel area.



This halt in stringer proceedings will facilitate the pouring of the lead keel into some of the boxed out aluminium sections of the 'deadwood'. There are other sections that are allocated for fresh water, diesel and the like. Ed pointed out that the lead would be poured straight in to the aluminium box sections – aluminium has a melting point of 650⁰ C and lead a melting point of 280⁰ C. Aluminium seal plates will then be fully welded to close off these lead keel sections. Ed has half a ton of lead and needs a total of 8 tons so if any members have a significant amount lying around that they wish to part with, Ed can help you out.

When all this is done, the stringers can be completed and some floors welded in. This will then clear the way for sheeting of the hull to commence. Ed is using 600mm wide plates that will be able to be pulled into place around the hull using a 'come along' to provide the horsepower. This will be achieved without any need to roll the sheets. As this phase progresses, access to the

inside of the boat will increase via the mezzanine floor where Ed has stored much of the inventory required for the later part of the construction process.



The framing out of the vessel includes a 9inch wide by 6inch deep socket on the deck to accommodate the bowsprit which will measure 2 metres clear from the boat. There is also a Samson post constructed from a 100mm diameter aluminium tube with a 10mm wall thickness. At the other end of the 'ship' Ed explained how he had modified the stern post and transom design so that a trim tab could be fitted in a practical manner.

All of this raised the question as to how Ed had arrived at the scantling sizes skin thicknesses to use, given that the design was drawn for timber construction. He referred us to Dave Gerr's book, "The Elements of Yacht Strength" which specifically details this type of conversion and makes recommendations on materials sizes for different types/materials of construction. Incidentally Dave Gerr is also the author of "The Propeller Handbook".



And then of course there was the inevitable question of "what are you going to do when the boat is finished?" Ed's reply, "sail around the world". (he's previously been around 2.5 times and his previous vessel had done 56,000 miles so the latest objective doesn't sound like a big deal to Ed).

We thank Ed for facilitating this return visit to see his project literally taking shape. This was a very informative and enjoyable afternoon and members look forward to future visits as this very major project progresses. Thanks Ed.

ADMINISTRATION NOTES

ABBA COMMITTEE

President/Editor	Chris Davis	9387 5042
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	Alun Dufty	9272 8905
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OCTOBER TECHNICAL MEETING

The next technical meeting of ABBA will be held at the South of Perth Yacht Club as usual, 7.30pm for an 8.00pm start on Wednesday, October 1st, 2014. This meeting will commence with a short Annual General Meeting which will be followed by a number of members participating in short 'Show and Tell' presentations about their boats, boat building and other maritime adventures. We have not had one of these nights for some time so this should be a great night to share our experiences.

NOVEMBER TOOLBOX VISIT

Our next toolbox visit on Saturday 1st November will be hosted by Peter Turner of Maritime Electronic Services, a company specialising in marine electronics and located in Fremantle at the Fishing Boat Harbour. Maritime Electronic Services is a family business which has been providing marine electronics equipment and support services to WA's recreational and professional boating sectors for over 40 years. The company sells, installs, services and repairs an extensive range of marine electronic and electrical equipment including, amongst others, marine radios, EPIRBs, depth and speed instruments, GPS chart plotters, autohelms, magnetic compasses, radars and navigation equipment. Peter is the owner and Managing Director of Maritime Electronic Services and has been with the company for almost 16 years. He will be providing ABBA members with information on entry level equipment suitable for small powerboats and yachts. Maritime Electronic Services' workshop and product showroom are located at 3/28 Mews Road, Fremantle.

SPECIAL NOTE -- SHIRTS & ABBA LOGOS

Don't forget — if members wish to bring along their own shirts to the next meeting then Bruce Cadee can arrange for logos to be embroidered. Members can bring as many shirts as they like but the club will pay for up to 2 logos. If we could do this in batches if at all possible this would be best for our supplier.

JANUARY TOOLBOX IN DECEMBER

The Toolbox in the next cycle falls in early January 2015 which is a somewhat inconvenient time for most of us. We are exploring the possibility of having an informal Toolbox afternoon at Maylands shipyards just before Christmas for a sausage sizzle and general look around the yard. Stay posted for further information to follow.

ADMINISTRATION NOTES (Cont'd)

ABBA LOGO

Members are reminded that Bruce Cadee has made arrangements with Shaun Luong of Image Embroidery at 26 Tulloch Way, Canning Vale (Phone 9456 2324 Mobile 0403 250 389) for an embroidered ABBA logo. The logo can be applied to your own clothing (assuming it can be accommodated in their equipment) or to shirts, caps or hats purchased through Image Embroidery. Feel free to call in on Shaun to look at the limited range of clothing he has on site or visit the following web sites to choose your preferred style, size and colours. The weblinks below are only examples of the wide range available. Half chest measurements are included on the web sites to help ensure you select the correct size. Ladies styles are also available.

Clothing (excluding Logos)

Style 1300 – Aussie Pacific Mens Murray Polo, Navy/White/Ashe or White/Navy/Ashe - **\$20.00 + GST each**

Weblink: http://www.aussiepacific.com.au/the-murray-polo-navy-white-s?color=Navy%2FWhite%2FAshe&primary_color=Navy&secondary_color=White

Style 1304 – Aussie Pacific Mens Eureka Polo, Navy/White/Ashe or White/Navy/Ashe - **\$21.00 + GST each**

Weblink: http://www.aussiepacific.com.au/mens/polos/eureka-polo-sky-navy-s?color=Sky%2FNavy%2FAshe&primary_color=Sky&secondary_color=Navy

Hats/Caps (excluding Logos)

Style 4199 – Headwear Brushed Heavy Cotton Cap, White/Navy (many other colours available too) - **\$6.50 + GST each** **Weblink:** <http://au.headwear.com.au/productDetails.cfm?&prodID=53&prodCatID=2&pageNumber=1>

(Also refer poly/cotton legionnaires hats Styles 4057 or 4126 for maximum sun protection under website sub heading 'Hats, Visor & Beanies' <http://au.headwear.com.au/productList.cfm?&pCategoryID=7>)

Style 4199 – Headwear Brushed Heavy Cotton Cap, White/Navy (many other colours available too) - **\$6.50 + GST each (includes poly/cotton legionnaires hats for maximum sun protection under website sub heading 'Hats, Visor & Beanies')**

Weblink:

Style 4223 – Brushed Sports Twill Bucket Hat, White/Navy (many other colours available too) - **\$8.00 + GST each**

Weblink: <http://au.headwear.com.au/productList.cfm?&pCategoryID=7&page=2>

To make your annual membership even more value for money, ABBA will pay for up to 2 logos per financial year to be applied to your items of clothing. The current cost to ABBA is \$7.15 per logo. There is no intention for this to be an ABBA uniform so the choice of style and colour is totally yours. If you are seen wearing the logo while building, working on or using your boat or anywhere for that matter it might get people asking questions and wanting to join our association. You are free to deal direct with Image Embroidery but please ensure you get an itemised invoice showing a separate price for the logo and present this to Bruce Cadee for reimbursement. Bruce Cadee is happy to take orders and liaise with Image Embroidery if you so wish.