



AMATEUR BOAT BUILDERS' ASSOCIATION

June July 2014

NO JUNK ABOUT THIS !

Our speaker for the June Technical Meeting was Roselt Croeser who addressed us on the conversion of his 18 ft Spacesailer 'Squirt' to junk rig and on his subsequent sailing experiences in the boat. I'm sure many of those present were quite surprised at the amount of detail required to successfully complete such a project and the extensive advantages that this junk rig offers in practice – perhaps a reason why there is a substantial following for this rig across the cruising world at least.



The first point of detail that Roselt explained to us was that the junk rig has a whole vocabulary of its own. Understanding the concepts (and conflicting stories) of the junk rig is assisted by a library of material available around the world including an article titled 'Junk Rig for Beginners' by Arne Kverneland which is accessible via the following link;

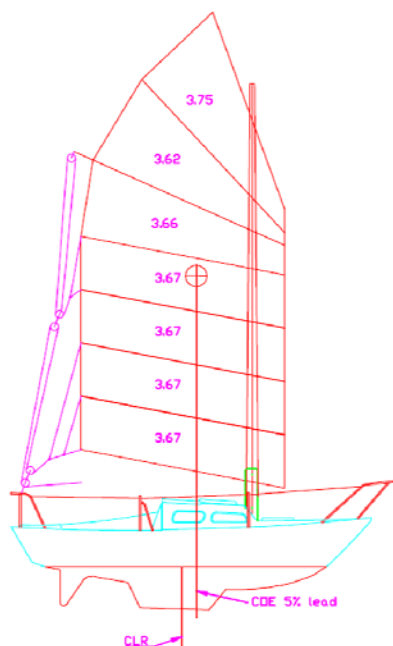
<http://www.junkrigassociation.org/Resources/Documents/Arne%20Kverneland's%20files/Junk%20Rig%20for%20Beginners.pdf>

Whilst there are no fixed rules for the junk rig and everyone tends to do their own thing, there are some common components and Roselt explained the main ones to us. These include the following;

- Batten parrels are lines that hold the battens loosely to mast. They enable the skipper to adjust the fore and aft position of the sail under way.
- Hong Kong parrels are lines that support the sail panels diagonally and prevent diagonal creases forming. They are entirely on the sail side of the mast.
- the luff parrel runs around the mast to each batten front end in turn and is used to fix the sail's position when it is hoisted
- lazyjacks serve the same purpose as on a sloop rig to keep the sail constrained on the boom as it is reefed or lowered completely.
- a number of sail shapes and batten configurations which have been developed and used by cruising sailors are recorded in the literature.
- junk rig generally uses multiple sheet attachment positions on the batten aft ends and the running sheet is combined via small blocks into a single sheet at the cockpit.

So.....why bother with the junk rig. The main incentives for conversion to junk rig are around the simplicity of the rig and the relative absence of complicated and expensive equipment. Because of the sheeting arrangements, the loads on each component are much smaller than traditional rigs and therefore the rig is not only less expensive but also less prone to breakage. The junk rig can be fully controlled from the cockpit and does not require any ventures to the foredeck. The rig can also be much more easily reefed than a traditional rig and hence in the first instance a larger sail area can be set in favourable conditions. Roselt referred here to the junk rigged folkboat Jester which Blondie Hasler sailed, largely from the cabin, without venturing outside.

With this back ground summary, Roselt explained his Spacesailer 18 junk rig conversion project in detail.



The Design

He commenced with a standard sloop rigged Spacesailer 18. The first step was to draw a scaled elevation of the existing boat including the sail plan and find the centre of area of the sloop rig. Roselt then developed the design for his junk rig sail using a Vincent Reddish modified version of the Blondie Hasler design and locating the centre of area in the same place as the original sloop

sail. The area of the junk sail was approximately equal to the combined mainsail and jib area of the sloop rig. The aspect ratio was 1:1 (ie the sail was approximately square) and the objective was to have 10% balance. These criteria required the mast to be relocated further forward on the hull.

The Mast

The junk rig has a free standing and unstayed mast which is stepped on the keel and well supported at the deck. As there appears to be nobody in Perth who is a specialist in this field, Roselt and Harry Speight developed the mast design from cantilever calculations themselves. Roselt researched the use of aluminium but ultimately built a three piece wooden mast using recycled oregon on the outside with a radiata pine lamination in the centre – all glued together using the WEST system, epoxy coated and then painted with SolaGuard house paint. The completed mast was 6.8 metres long and weighed 29 Kg. It was supported by an additional beam across the boat inside and boxed in at deck level where it passed through the forward face of the cabin trunk.



The Sails

The sails were 13 m² in area and made up in five panels of heavy Dacron by North Sails. They were made with minimal camber but were not flat. They were supported initially by fibreglass battens but these proved ineffective and were soon replaced with polypipe. Similarly, the wooden boom was fairly quickly replaced with a large diameter polypipe.

Rigging

Roselt rigged the Spacesailer with a two part halyard and sheeting along the lines of the Hasler rig using the main sheet block from the original sloop rig. Initially he tried batten parrels but found by experience that they were not very useful and in the longer term used just luff parrels and down hauls to adjust the sail position on the mast. The sheeting was attached to the boom end and battens on the leach end of the sail; and lazy jacks constrained the sail to lie along the boom when the sail was reefed or completely lowered.

Performance

In practice, the junk rig tacked through the same 110 degree angle made good over the ground that the sloop rig had achieved. But the big up side was the ease with which the rig could be

handled and the boat sailed. In particular, sailing on and off moorings was easier and reefing was very simple. In fact, the boat could be sailed off the mooring with the sail reefed and the full sail could then be easily hoisted when outside the mooring area. This was in addition to the rig allowing everything to be done without leaving the cockpit.

The mast performed satisfactorily even in knockdown conditions and the boat sailed well on all points of sailing and all wind strengths except in light airs. Croselt indicated that the rig was not as good in light winds of less than 5 knots. A wind vane that Croselt built also sailed the boat well in upwind and reaching conditions. The rig produced little or no wind noise and the configuration allowed good visibility under the sail at all times.

Conclusions

In closing, Croselt spoke of his main conclusions in regard to the junk rig based on his experience over the two years that he sailed 'Squirt',

- For a cruising boat, the junk rig performance is comparable with a casually sailed jib and main rig for the same hull. He found that this performance was better on the port tack when the sail was against the mast and was also improved when the luff parrels were tight.
- The ease of use of a junk rig is way ahead of the sloop rig.
- The junk rig benefits by its simplicity. There is no need for any winches, there are only a few blocks, only one sail, no mast track and overall one feels much more in control of the rig.
- The free standing mast reduces the complexities and worry of multiple fittings and their associated breakage risk on a stayed mast, there is minimum noise and the rig is more resilient to shock loading.
- The keel stepped mast option is difficult to get up and down and presents challenges in achieving secure bracing.
- The rig has somewhat of a "messy" look which may not be to everyone's liking.

However, the junk rig can be adapted easily to fit most needs and you can design your own and make it yourself.

If Roselt was doing this again he said he would

- develop a tabernacle style of mast step.
- use softer sail material which would accommodate a neater reefed sail bundle. Experience showed that the sail material does not work hard.
- consider building more shape and camber into the sail
- consider having a larger sail area specifically for use on light wind days.

For those that may wish to study this form of rig further there is a very large amount of material available on the web. Roselt referred us to the following references;

'Practical Junk Rig' by HG Hasler and JK Mcleod

'Voyaging On A Small Income' by Annie Hill

<http://cruisingashiki.blogspot.com.au/>

<http://speedwelladventures.com/blog/>

<http://www.junkrigassociation.org/>

<https://groups.yahoo.com/neo/groups/junkrig/info>

This was a fascinating presentation on an innovative and intriguing subject and we thank Roselt for sharing his journey with us.

'TECH MEETING IN A TOOLBOX' - FIBREGLASS REINFORCED PLASTICS SIMPLIFIED

The July toolbox visit was to Fibreglass & Resin Sales where our host, Charlie Urwin, together with one of his staff, Laney (he calls them his girls), gave us a very informative presentation and demonstration of the full range of fibreglass materials and how they can be used in so many different ways to construct so many different things – including boats of course.



Charlie commenced with a bit of background on himself and the industry generally. He has been in the business of composite construction for most of his working life and has expertise in its application to racing cars, light planes and gliders and to boats. He was also licensed to work on wooden airframes in his earlier years. Over this time he has experienced the growth of this industry into a very varied market place. Whilst resin systems per se are not new – they date back to the 1914/18 war – they have moved on from the casines (milk derivative), tree based resins (similar to hot glue guns) and bakelites (still used in some fire situations) to the modern resin based systems of today. Charlie noted here that one of these, Araldite, was on the 'secrets list' until 1952. The use of fibreglass has also developed from simple two dimensional applications to quite complex three dimensional applications including artworks.

Charlie pointed out that the use of the terminology 'fibreglass' is erroneous as fibreglass is the fibrous reinforcement by itself. It needs the addition of the resin to form the matrix that then is correctly termed 'fibreglass reinforced plastic' or 'FRP'. This then led to an explanation of the different reinforcements (includes fibreglass, Kevlar and carbon fibre) and the various resins including polyester, vinylester and epoxy. The reinforcements also come in different configurations. Chopped strand matt consists of a matt of random fibres held together by an emulsion binder which dissolves when the resin is applied (however needs a special binder for epoxy resin) and woven fabric which comes in numerous weaves and styles. The type of resin and reinforcement depends on the nature of the project – construction of a complete wooden boat, gluing components on a wooden boat or water proofing a wooden boat.

RESINS

Charlie then explained in detail the difference between a polyester type resin and an epoxy. Polyester is a long chain resin and can be likened to a chain that becomes one when all the links are welded. The chemical reaction is started by the addition of a 'catalyst' which disappears and

takes no part in the final product. The disappearance of the catalyst as the reaction proceeds and the resin sets results in some shrinkage which is common in this type of resin. The speed of the reaction can be controlled with respect to varying temperature conditions by the addition of more or less catalyst. Hence, small variations in the amount of catalyst do not impact on the integrity of the final result. Vinylesters are very similar to polyesters but have better chemical resistance.

On the other hand, epoxy resins cure following the mixing of an exact proportion of resin and hardener. In this case, the hardener is an integral part of the final product and therefore epoxy resins do not shrink as they cure. BUT, the mix ration must be maintained and particularly in summer, the curing time can only be slowed by changing the temperature of the mix by use of some means such as an ice bath. The best advice is to work quickly as the epoxy resin will commence its 'cross linking' process very quickly in warm conditions. And for all these resins it is important to know the time required to gain full cure and full strength.

REINFORCING FABRICS

Next we moved to discussion on the various fabrics that provide reinforcement to the resins. Chopped strand matt is labelled by weight in oz/ft² (typically 225, 450 and 600) and requires 2.5 times the resin of woven fabrics to wet it out. Woven fabrics come in various different weaves and are labelled by weight in gms/m². The common woven fabrics are plain weave (one warp end weaves over one weft thread), crows foot (two or more warp ends weave over and under the same number of weft threads), twill weave (one or more warp ends weave over or under two or more weft threads in a regular fashion) and satin (each warp and weft threads weaves under three or more and under one crossing thread). There are also woven rovings which are a much heavier fabric (630gms/m²) that will not curve, Dynel, a polyester (not fibreglass) woven fabric generally used with an epoxy resin, carbon fibre (high tensile/longitudinal strength) and Aromid (or Kevlar) which has a higher impact resistance but is harder to repair.

Similar material is also available in a non woven form in which the threads may be aligned in a number of different configurations including unidirectional, bidirectional and triaxial. These accommodate the need for designers to vary the directional strength in an FRP component dependent upon its use. In this regard also, the relative strength for carbon fibre is six times fibreglass and for Kevlar is 3 times fibreglass.

All these materials come in a wide variety of weights and varying widths off the roll. It was noted that the lighter fabrics are relatively more expensive because weaving the lighter material is more difficult than weaving the heavier ones. As a guide to cost, the range of normally used fibreglass woven fabrics are between approximately \$5 and \$45 per metre, Kevlar \$45 to \$85 per metre and carbon \$82 to \$140 per metre.

FILLERS

Various types of fillers can be used with resins for different purposes such as fairing, filling and coving of FRP projects. Charlie showed us three products that he stocks – 410 Microlight for fairing, 411 Microspheres for general fairing and 403 Microfibre for coving joints. There are also pre-filled systems available in which the filler is already added to the resin.

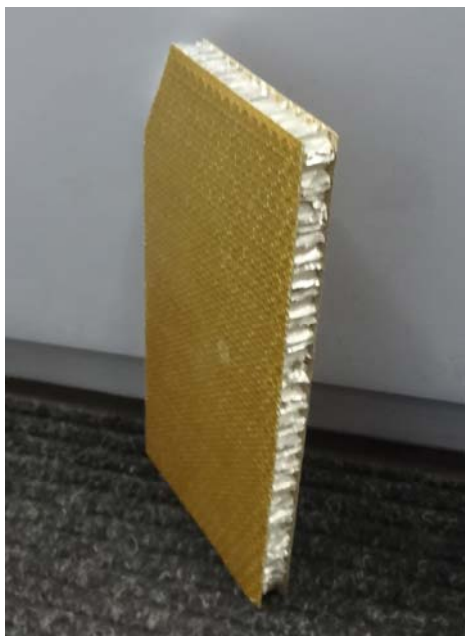
For all of these materials, Charlie pointed out that it is critical that surface preparation be completed properly. The surface needs to be sanded to break the surface fibres and the resin mix applied immediately. On oily timbers such as teak, there will also be a need to use acetone or

isopropal alcohol to wash down the surface just prior to applying the glue. By way of example, when manufacturing finger jointed timber, Bunnings found that they achieved a 15% strength increase if the gluing was done immediately following preparation compared with joints where the preparation had been done some time before application of the glue. There was also the case of the two friends doing identical projects using identical materials and methods but achieving different results. The cause was traced to one of them who had a problem with flies and had sprayed fly spray near the job just before applying the glue. The invisible fly spray mist had landed on the prepared joint and affected the end result.



CORE MATERIALS

Core materials are generally used to separate two layers of FRP to create a very strong composite which can be used as a construction method in a wide variety of projects. It follows that there is a wide variety of core materials available to suit different purposes. The best way to select the most suitable of these is to make up a test piece and load test it before committing to the whole job.



The simplest of these is Divinycell, a foam sheet material that is available in thicknesses from around 6mm up to several hundred mm. When used with a fibreglass layer each side this is a very strong material for general construction such as building a dinghy or super structure. Another alternative is Nomex, a honeycomb type material which bends well in one direction but is very expensive. For more complex projects there is X-Panel made up with corrugated aluminium

sandwiched between fibreglass panels each side. Also end grain balsa which has been used for a long time for this purpose is still available but not cheap. It is particularly good in compression.

FINISHES

Special hardeners are available for resins which will be intended to be the clear finish on the project. Top coats may be air dry single pack polyurethanes or a two pack polyurethane which is the recommended approach.

In closing, Charlie touched briefly on vacuum pumps and associated accessories which are all now available at a cost which may be economical for amateurs undertaking significant size projects.

This was a very interesting and informative 'tech meeting in a toolbox' and we thank Charlie and Laney for sparing their time on a Saturday afternoon to share their immense knowledge with us all.

'Letter to the Editor'

Following the last Toolbox article on our visit to see the latest in high tech moth developments at Fastacraft, Margo Beilby emailed advising that Mike would have been interested but was not a fan of skiff moths, having sailed one in England during their visit in 1975. Mike was very happy sailing his scows as can be seen in this great photo. There have been some changes to the hill in the left background over the years as well!



ADMINISTRATION NOTES

ABBA COMMITTEE

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	Alun Dufty	9272 8905
	Harry Speight	9295 4518
Library	Rosemary Nayler	9455 1470

AUGUST 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, August 6th, 2014. Once again, organizer extraordinaire, Harry Speight, has arranged a very interesting presenter for our enjoyment.

Pete Ripley 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 will be the subject of his presentation; tall ship sail making; tools, methods and materials, traditional and modern.

SEPTEMBER TOOLBOX VISIT

Our next toolbox visit will be on Saturday afternoon September 6th, 2014, from 2.00 to 4.00 pm. This is a return visit to member Ed Essers project, the beginnings of which we visited in November, 2013 (See the Dec Jan 2013 14 Newsletter).

Ed is constructing a 14m (45'-3") deck length, 4m beam, 17 tonne, Mobjack design Herreshoff ketch in aluminium plate. The original plans, intended for construction in wood, are in great detail but Ed will be fabricating the framing and most of the fittings himself in aluminium.

Ed is currently building the frames and expects to be putting the keel together and mounting the frames on it shortly. Attachment of the longitudinal stringers will then follow. By the time of our visit, there should be a 'see through' boat in frame to inspect, possibly with some lead in the bottom of it.

Ed's address is 43 Moore Street, Wungong. Heading south out of Armadale on South Western Highway, Moore Street is on the right just over 3 kms from the Albany Highway traffic light intersection. Number 43 is the last house on the left hand side at the west end of Moore Street and Ed's shed is down the second driveway.

ADOPTION OF A NEW ABBA CONSTITUTION

The last newsletter advised that a short Special General Meeting would be convened in conjunction with the August Technical Meeting. On studying the existing very old Constitution, we have run into a few minor road bumps regarding the formal process for calling this Special General Meeting which will be resolved shortly. In the meantime, any feedback or comment would be appreciated as per details in the last newsletter.

ADMINISTRATION NOTES (Cont'd)

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.

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.
