



Figure 1 – The damaged section of mast.

I recently had the privilege of being involved with the *James Craig* forward mast spar repair. During the annual rigging inspection, there was deterioration identified with significant rot identified behind the metalwork of the trestle trees and mast doublers for the base of the topgallant mast, which had extensive rot behind the mast band that secures it to the bottom mast section.

As a result cracking in the area was evident as shown at Figure 1. At the time there were no suitably sized Douglas Fir logs available (see p32) to manufacture a new spar.

The solution was to scarf in new pieces of clear grain Douglas Fir gluing it all together with Epoxy Glue. The services of Cyril Humbert, the shipwright at Cameron's Slipway & Marina at Balmain, were called upon to carry out this task as he had prior experience completing such repairs in Europe.

To give you an idea of the scale of the operation, the dimensions of the spar are – square section 275mm, round section 340mm with an overall length of 12 metres and weighing in at 1.5 tonne.

As you can see it is not something you can throw over your shoulder to carry around and the operation had to be planned

and coordinated to maximise the volunteer's availability and ensure the *Craig* was not out of service for too long.

The Project Management for this detailed evolution fell on the busy shoulders of Tim Drinkwater, Sydney Heritage Fleet Maintenance Manager .

The first step was to cut off the offending section of mast; that meant there was no turning back. The next step was to cut in a 1 in 16 scarf as shown at Figure 2 on each side of the remaining good mast section. This was to facilitate maximum surface area to glue on the lengths of 100 x 100mm Oregon, sourced from Anagote Timbers, Marrickville in Sydney.

At this stage, there was discussion over glueing technique as the Sydney Heritage Fleet (SHF) had traditionally used a well known brand of epoxy for all glueing applications.

Cyril would not use it on two grounds as he had developed sensitivity to the old technology stuff and did not want to further expose himself to increased sensitivity. He uses EPOX-E-Glue & Bote-Cote Epoxy Resin due to the modern technology chemicals used that makes them much safer and Cyril does not suffer any sensitivity issues using them.



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Figure 2 – Chamfered section of mast.



Figure 3 – First side glued and clamped.

The other reason he selected EPOX-E-Glue was that it had a considerably longer working time, which was important with the large surface areas being glued at a time. In addition, it was much easier to mix in larger quantities with its 1:1 ratio.

This is where I came in, to provide the technical advice and assure the SHF management that Aussie developed and manufactured Epoxy was as good as the French shipwright reckoned. Once all of the technicalities were solved, the reconstruction started and it took a couple

of days to glue the first side as shown in Figure 3.

Due to the end grain exposure on the scarfed surfaces, it was important to coat the surfaces with Bote-Cote Epoxy Resin first, to wet out the timber to ensure the joint being starved of glue due to resin being drawn out of the glue into the end grain.

This is an important process to ensure the strongest possible joint.

The next step was to laminate the scarfed lengths of Oregon together and



Figure 4 – Square section at completion of glueing.

onto the mast section using heaps of clamps. The clamps were only tightened sufficiently to hold everything in place. Squeeze all of the epoxy out of the joint and it will be a weak joint.

After 24 hours, the beast was rolled over and the other side was laminated using the same technique. This provided

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Figure 5 – Peter Gossell shaping the mast.

the square section required at the base as shown at Figure 4. By the way, the longer it takes Epoxy Glue to cure the tougher and stronger it will be.

Master Shipwright, Peter Gossell was called in at this stage and tasked with

the job of shaping the mast and give it character.

This took many hours of patient whittling with traditional wood working tools and skills as shown in Figure 5. Once Peter had weaved his magic, the mast was then coated with several coats of varnish, as I have not been able to convince the traditionalists that the Clear System (sealing timber with Non Yellowing Bote-Cote then applying Clear Aquacote water based polyurethane) will give them many years of maintenance free service.

Once all of the wood butchering was completed, it was back to the riggers to hoist the beast into place and then its little brother above it.

This was no mean feat as the mast sections needed to be lifted into place by crane. Then all of the rigging and fittings had to be set up to bring the *James Craig* back to life.

This all happened in 2013, with only a few weeks available to resurrect the damaged mast before the Royal Australian Navy International Fleet Review on the October long weekend. This involved many volunteers putting in long hours to make sure the *James Craig* was operational in time for the visiting tall ships entering Sydney Harbour as shown in Figure 6.

The fact that this ship has been fully restored and maintained in operational service is a credit to the many volunteers who keep her in pristine condition and take her to sea regularly.

I recommend a trip on *James Craig* to anyone with or without salt in his or her



Figure 6 – James Craig during RAN International Fleet Review.

veins. I know that I found it very exhilarating a few years ago when I was shouted a day offshore as a birthday present. If you are interested or I have convinced you to put it on your 'bucket list' contact the Sydney Heritage Fleet at www.shf.org.au or telephone 02 9298 3888.

Douglas Fir logs

Back to not having suitable logs available to manufacture a new mast.

Peter Gossell had been working with NSW Forestries for a considerable time to obtain some logs from an experimental plot of Douglas Fir planted in 1927 in southern NSW.


The problem was that there had been considerable rain in the area where the logs were located and the logs could not be extracted and seasoned in time to use for the replacement mast. This was good for us at Drive Marine Services in Sydney as it provided the opportunity to prove the EPOX-E-Glue in a highly stressed application.

This technique could and should be used if scarfing a new section into any wooden mast or a large beam is to be repaired. I am sure this technique would ensure as strong, if not stronger spar as a spar carved from a single piece of timber. The reason being that you can ensure the timber is clear grain with no imperfections and the combination of Bote-Cote Epoxy Resin to wet out the end grain and then EPOX-E-Glue is much stronger than the timber of a single log. ⚓

**Dave Giddings distributes the BoatCraft Pacific Modern Technology products. As the owner of a Clansman for 20 years he has developed a knowledge of what works with restoring tired timberwork and fibreglass.*

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