

Rigged and ready

BUILDING A NEW SPAR FOR ENDEAVOUR

Storm damage to the museum's HMB *Endeavour* replica during a recent trip to Hobart necessitated the construction of a new spritsail yard. *Endeavour's* first mate, **Anthony Longhurst**, details the process.

The broken spritsail yard.
All photographs by Anthony Longhurst/
ANMM unless otherwise stated



ENDEAVOUR SAILED FROM SYDNEY on 28 January after joining in the annual Australia Day celebrations on Sydney Harbour. She was heading to Hobart to attend the biennial Classic and Wooden Boat Festival, which is the largest of its kind in the southern hemisphere. *Endeavour* was likely to have been a star attraction, being the largest wooden ship in Australia.

Unfortunately nature had other ideas. After *Endeavour* left Sydney, an intense low-pressure system developed, causing strong southerly winds and large seas and swell – the worst possible weather for *Endeavour* to head south in.

In the days of the original *Endeavour*, the master would have had no choice but to heave-to the ship off shore and wait for more favourable weather. Time would not have been an issue and delays due to weather were common on most voyages.

After carefully reviewing the weather and developing a conservative plan, including fallback options if there were no improvement, we tried to use the engines to head into the southerly winds and seas – an option not available to an 18th-century master. We kept a careful eye on the ship's masts, rigging and speed, adjusting the ship's angle to the wind and sea so that she was not working too hard.

After motoring for several days and making a slow 160 nautical miles to the south, *Endeavour* rode over a large wave and pitched into a deep trough, burying her bowsprit and jibboom. The spritsail yard that is attached beneath the bowsprit did not survive the pressure, breaking in two at its centre. Attached to the spritsail yard are the jibboom guys, which provide important downward support for the jibboom and add support to the fore topgallant mast. With the loss of this support, pushing the ship into a heavy head sea for at least another four days – let alone the remaining 1,000-plus nautical miles of planned voyaging ahead – was deemed too risky, even with the jury-rigged martingale that we put in place shortly after the yard broke.

We made the difficult decision to turn the ship and head back to Sydney. Using the resources and support of the museum, we figured we could replace the yard and return the ship to sea to make her passage to Hobart. We emailed the dimensions of the yard through to the museum using *Endeavour's* satellite communication system and a plan was put into action.

We decided it would be easier and faster to replace the broken yard rather than

repair it, and chose Douglas fir (Oregon) for the task. All of the spars, decking and topside planking on *Endeavour* are Oregon. This timber is used because it has good flexibility, is relatively lightweight (approximately 560 kilograms per cubic metre) and is fairly easy to source. The timber for the replacement yard was of exceptional quality, having a very tight, straight grain with no knots in lengths of up to six metres. In all, 80 lineal metres of timber were bought to be glued (laminated) together to build the new yard, rather than trying to find a single straight tree to shape it from. Laminated spars are also stronger than those made from a single piece.

Endeavour rode over a large wave and pitched into a deep trough, burying her bowsprit and jibboom

We had a great team that was made up of Fleet staff and volunteers from the museum plus some assistance from the Sydney Heritage Fleet. To make the yard, the planks (or deals) of Oregon were dressed to a uniform thickness, all glued faces were roughed up to ensure the glue would adhere properly and 12:1 scarf joints were cut so that the yard's overall length could be achieved by joining shorter lengths together without losing any strength. Six layers of timber were glued together with epoxy to make a square section of laminated timber 12 metres long. All of the scarf joints in each of these laminated layers were staggered so that no two joints were located in the same area, to avoid creating a potential weak point.

After the glue had cured and all of the clamps were taken off, the taper of the yard was marked out using the same ratios that would have been used more than 200 years ago. All yards have taper, meaning that they are thicker in the middle and become smaller towards each end. Once the taper was marked, the excess timber was cut off with circular saws, chisels and power planers, while maintaining the square cross-section shape throughout. We had only a week to get the ship out sailing once more, so using power tools sped up the process.

After the tapering was completed and the yard roughly faired (smoothed), we needed to make it octagonal. We employed a technique that has been used for centuries

which achieves this in such a way that the yard remains round and does not end up oval-shaped or irregular in cross section. With the cutting lines marked, we set the circular saw to a 45-degree angle and cut off the corners. We then faired the eight faces to remove high spots and ensure the yard remained straight and true.

Marking out once more and initially using only power planers, we took off the corners of the octagonal yard to make it sixteen sided. We faired the faces with traditional long-sole try planes, spending some time on this step to ensure the new yard would turn out perfect. We then took the corners off the 16 sides, firstly with power planers set at a shallow cutting depth, then fairing the resulting 32 faces with the hand planes.

Sanding the yard made it perfectly round, and the timber was then sealed with an epoxy wood sealant. The fittings from the broken yard were overhauled and fitted to the new yard, which was then painted.

Once the paint had dried, all that was left was to dress the yard. This involved fitting the foot ropes (horses) that enable the crew to climb out on the yard to handle the sail upon the yard at sea. The truss (the rope sling that holds the yard to the bowsprit) was seized, and we attached the clew blocks, bunt blocks, jibboom guy blocks, halyard blocks and the safety lines to which the crew can affix their harnesses.

The yard was moved to the ship on a floating pontoon where the running rigging was attached, including the halyard, braces, lifts and jibboom guys. The yard was raised into position and the truss, once passed around the bowsprit, was finally seized in place. The sail was then bent (attached) to the yard and *Endeavour* was once more ready for sea – with one afternoon to spare.

It was a tremendous effort by all involved to achieve this in only seven days, enabling *Endeavour* to return to sea to complete her voyage to Hobart and showcase the ship to the public in Tasmania. We enjoyed great sailing on the passages to Hobart and back to Sydney, enabling us to experience *Endeavour* coming to life and being in her element.

Anthony Longhurst is HMB *Endeavour's* leading hand, shipwright, rigger and first mate. His involvement with tall ships began in 1986 at the age of 13. From 1995 until 2000 he sailed with *Endeavour* as a watch leader, shipwright, sailmaker and boatswain on her first world voyage. Anthony rejoined *Endeavour* in 2005 when she came under ANMM management.



01



04



02



05



03



06

- 01 Cutting the scarf joints.
Photograph Eden Alley-Porter/ANMM
- 02 The team glue up the planks, after first roughing up the timber to give greater grip.
Photograph Mark Edwards/ANMM
- 03 The clamps go on.
Photograph Eden Ally-Porter/ANMM
- 04 The yard is cut and planed into a tapered square.
- 05 Planing to make the yard 16-sided.
- 06 Dressing the yard.
- 07 The completed yard on the ship.



07