

# IN FOCUS

Speed **is** of the  
**ESSENCE**



## THE PRIDE OF AUSTRALIA, HMB ENDEAVOUR, SAILED IN AND OUT OF DOCKYARD IN DOUBLE-QUICK TIME. THIS ARTICLE DESCRIBES THE SELECTION AND USE OF A PROGRESSIVE MAINTENANCE PROCEDURE AND APPLICATION OF A MODERN COATING SYSTEM ON A WOODEN-HULLED REPLICA SHIP. By Jack Innis, consultant

**S**peed is important, even to historic sailing ships. For example, the vessel that took Captain Cook on his epic 1768-71 voyage of discovery, *HMB Endeavour*, was outfitted with masts and spars that allowed 28 sails to hoist approximately 930 square meters of canvas. Cook's voyage contributed greatly to the world's knowledge of seamanship, navigation and geography. One lesson learned along the way was that any small increase in the ship's speed, when multiplied over days, weeks, and months at sea, equated to huge gains in distance.

That knowledge is not lost on the captain and crew of the modern day replica, *HMB Endeavour* (HMB stands for Her Majesty's Barque, a designation owed to the ship's hull shape). Commissioned in 1994, *Endeavour* has sailed more than 170,000 nautical miles, circumnavigated the globe twice, visited 29 countries and many Pacific islands, and served as a floating museum in more than 100 ports of call.

But after 20 years at sea this stalwart example of Australian maritime pride desperately needed new bottom paint.

### OLD SCHOOL SHIP, NEW SCHOOL ABRASIVE BLAST

*Endeavour's* custodians, the Australian National Maritime Museum, selected Garden Island Naval Dockyard in Sydney Harbour for the haul out; but speed was of the essence. The 144-meter-long (length overall) *Endeavour* was slated to participate in the Royal Australian Navy's Fleet Review as part of the 100 year anniversary of the naval fleet arriving in the harbour. The tight schedule meant a looming deadline that allowed workers at the dockyard only 10 days to abrasive blast 416 square meters of 20-year-old bottom paint and apply a sophisticated, multi-layered coating system.

"In the case of *Endeavour*, we chose to take all the old anti-fouling coating off," said Captain John Dikkenberg during the haul out. "It had been here about 20 years, there was quite a build-up, and we wanted to create a new underwater protection system from scratch."

While specifications called for complete removal of the existing below-the-waterline coating system, those involved in planning

the abrasive blast on this historically accurate ship anticipated a potential problem with conventional sand blasting. Builders planked the ship's hull with Jarrah (*eucalyptus marginata*), a large hardwood tree that grows only in southwestern Australia. Although a tough wood, project overseers wondered whether over-aggressive blasting might damage the softer caulking between the planks. The project's tight deadline and budget simply did not allow the luxury of re-caulking *Endeavour's* entire hull.

### PLAYING SAFE

Project supervisors decided to play it safe and test two different blast methods: one old school and one new school. They began by taping off two, one-meter-square areas on the ship's hull. For test patch number one, the crew used conventional sandblast equipment to remove the bottom paint to bare wood. The blast went well, but close inspection revealed that in addition to removing too much caulking, the garnet blast media created an inconsistent surface profile on the Jarrah wood.

The crew similarly abraded test patch number two with a composite abrasive blast media comprising conventional blast media bonded to sponge. This did the trick; the bonded media blast removed the old bottom paint without compromising the caulking or over-profiling the hardwood.

"As the name would suggest, sponge encapsulated media acts as a cushion when it comes into contact with the surface," says Lee Woods, quality control coordinator for Favcote Professional Coatings, which supplied blasting equipment, abrasive media, and manpower for the coating removal portion of the project. "Like other blast media, sponge encapsulated media can be used to create an aggressive blast, but in this case the cushioning provided by Sponge-Jet Silver 60 aluminium oxide allowed greater control so that the sensitive substrate received only what was required."

Sponge encapsulated media blasting provided another advantage. Since the sponge media will typically capture and confine 98 percent of typical airborne emissions produced, the blast crew did not have to construct elaborate containment systems



typically associated with conventional blasting. This not only saved the time and money, but allowed other trades to work near the blast operation without unnecessary exposure to airborne dust, which in most instances contains a variety of unhealthy residues. Encapsulated media also scored high marks in removing chloride and other contaminants.

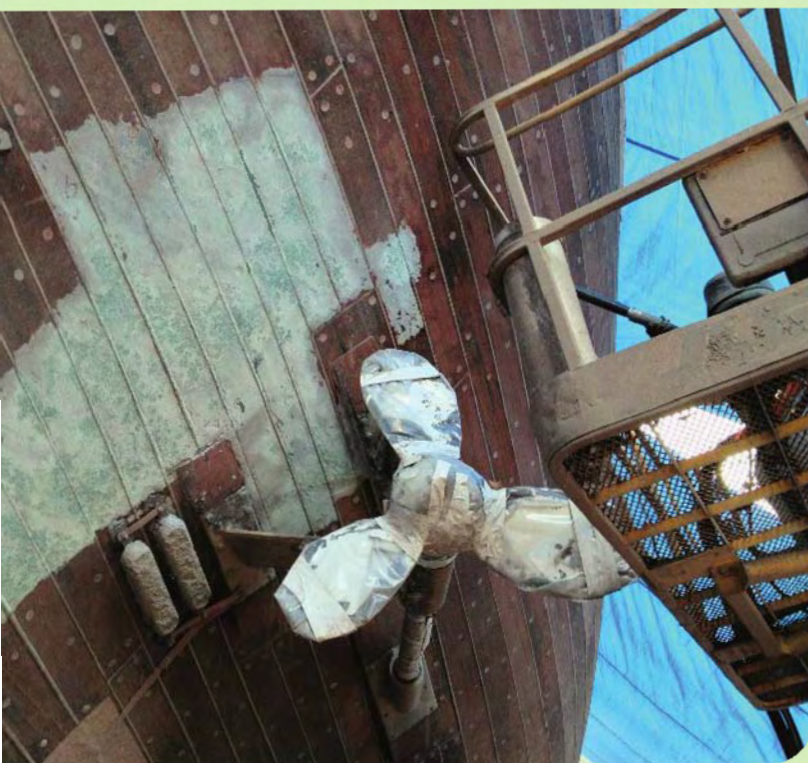
#### SIX DAYS BEFORE THE MAST

With only six days to blast *Endeavour's* hull, the Favcote team used highly durable blast tape and plastic encapsulation to protect the ship's propeller shafts (although a replica, modern safety regulations require such vessels to be outfitted with propulsion systems), through hull valve openings, and other underwater protrusions from the abrasive blast process.

Mitchell Harwood, Favcote senior supervisor charged with meeting the six-day blast deadline, organized a small team of abrasive blast nozzle operators and support workers in charge of vacuuming, sweeping, recycling spent media, and machinery operation. In order for Favcote to pull this project off, they'd have to work 12 hours a day. Harwood divided the ship's hull into six sections. This schematization allowed his crews to work independently, yet in concert with one another. It also allowed shipyard workers the time and space required to make various minor repairs to several Jarrah planks, the largest repair a replacement segment measuring approximately 300 square centimetres.

At the start of each shift, Harwood communicated to his crew the day's objectives regarding safety and expected progress. At the end of each shift, Harwood evaluated progress and inspected to make sure the blast tape and plastic encapsulation surrounding the underwater protrusions hadn't been breached.

Periodically throughout the blast, Favcote's support workers swept up piles of spent sponge-encapsulated media and coating residue



**The conventional blast media bonded to sponges did the trick; removing the old bottom paint without compromising the caulking or over-profiling the hardwood**

and fed the sweepings through a Sponge-Jet recycler. This allowed the crew to reuse the composite abrasive media eight or more times, saving money, time, and resources. Separating the spent media from the contaminants also lessened the total amount of waste that needed to be bagged, segregated, and



hauled off site by an environmentally certified waste disposal company.

Despite tough work and tight schedule, the crew finished blasting on time. Next the team used compressed air to remove all remaining residue from *Endeavour's* hull. This exposed a wood surface consistent with sanding with 80-120 grit paper, as specified by the coatings manufacturer, International Yachtpaint. Close inspection showed that the caulking seams looked great and that the ship's hull showed little signs of having been immersed in salt water for 20 years.

#### CHANGING TACKS

With the hull preparation complete, it was time to change tacks. Favcote handed the ship over to the crew chosen to tackle the multi-faceted coating application, Thales Australia. Thales' six-man crew had only four days to coat the hull, but planners gave them two extra days to apply additional coatings to recreate the boottop, a term that refers to a contrasting band of paint just above the waterline traditionally used to tell whether a ship is fully loaded or unloaded.

Using airless spray equipment, the Thales crew began by applying three (75-micron DFT each) coats of Intertuf 203. To stay on schedule, the crew sprayed two coats on day one—the first coat early in the morning and the second in the afternoon—making sure to allow at least eight hours cure time

“  
THE USE OF SPONGE  
ENCAPSULATED  
MEDIA WAS CRUCIAL  
IN ENSURING THAT  
OUR CLIENT'S  
CONCERNS WERE  
MET, AND ON TIME  
”



between coats as per manufacturer's specifications. The crew applied the third coat on day two.

On days three and four, the Thales crew used their airless guns to spray the hull with two single coats (100 micron DFT each) of Micron Extra self-polishing anti-fouling paint.

With the hull completed within the four days allotted, the crew shifted gears and applied plastic sheeting and adhesive tape to the hull to mark off the original boottop. They then used brushes and rollers to lay down two coats (104 micron DFT each) of Trilux 33 anti-fouling top coat, white in colour.

### SAILING UNDER REVIEW

In spite of a tough schedule, the blasting and coatings teams completed their tasks on time to make sure *Endeavour* didn't miss out on the Royal Australian Navy's Fleet Review. But before *Endeavour* could set sail for the Royal Navy review, the hull coating system had to pass a dockyard review – and it did!

Favcote Professional Coatings quality control coordinator Woods gives thumbs up to the new school composite media blast and coatings application. "Overall, in my personal opinion, the project was a huge success from start to finish," Woods says. "The use of sponge encapsulated media was crucial in ensuring that our client's concerns were met, and on time. And from a certified company and inspector's perspective, it could be seen that all staff involved in the application process were competent in their roles and applied the protective coatings as intended. A very uniform and consistent finish was achieved over the entire mass of the underwater hull."

*Endeavour* Captain Dikkenberg, quite pleased with the results, looks forward to obtaining more speed under sail. "Before the ship came into dock there was some growth on the bottom, and that does slow it down," says Dikkenberg. "It was good to see the ship out of water and restored to this high standard."

Just like Captain Cook's crew, this modern sailor realises that speed is of the essence! ■

