ON THE ROAD WITH BRIAN CUSHING

GEORDIE SHIPYARD IN INDIA

INDIA

The Vashishti River is one of the larger rivers in the Konkan coast of Maharashtra, an immense state on the western side of India. The river rises in the mountainous Western Ghats and wends its way westwards towards the Arabian Sea…

Picturesque and beautiful in some settings…

it's nevertheless prone to regular flooding in the monsoon season….

At the seaward end of its 45 km length, its banks are dotted with fishing villages and ancient forts and temples, and the small town of Dabhol sits at its mouth. During the early noughties, the Bharati Shipyard Limited's site was established on 300 acres of its north bank, about 2 kms upstream from Dabhol. At that stage, most of the effort at the yard was focused on building the essential supporting structures – stores, warehousing, offices, roads and the like, and shipbuilding was limited to some minor prefabrication work taking place on open ground.

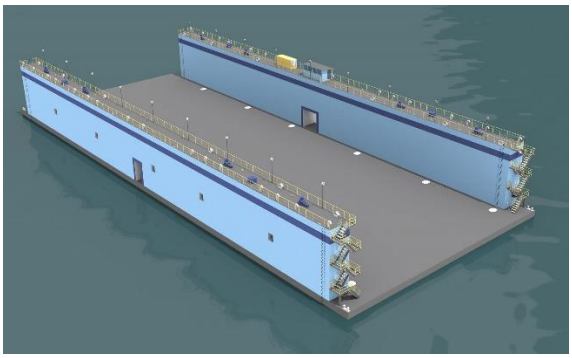
Otherwise, at this time there was little heavy industrial development. Certainly, on 7 May 2009 the scene was peaceful enough. But wait – what was this strange structure being towed into the river mouth from the open sea?

What this was, in fact, was an open-ended floating dry dock – some 150m long, 40m wide and 18m high, capable of accommodating vessels of up to 16,000 tonnes – which had been transported from the River Tyne in the UK, a voyage of some two months. It was originally in the ownership of the famous Swan Hunter shipyard on the Tyne, and was laden with cranes, barges, and numerous other pieces of shipbuilding equipment, also sourced from the yard. Yours truly was riding somewhere on that floating dock…

Floating dry docks – how do they work?

Commercial vessels of all types - including bulk carriers, tankers, container ships, passenger liners – have regularly to be drydocked in order that the underwater section can be examined and repaired or maintained as necessary, cleaned and paint coated. The same goes for yachts and military vessels. This can be achieved in one of two ways for larger ships: entering a graving, or dry, dock which consists of a floodable cavity excavated from the shoreline and closed off to the adjacent sea or river with dock gates; or by being lifted on to a floating dry dock.

Floating dry docks vary hugely worldwide in size and design detail, but essentially they consist of an open-ended box constructed of a double skin at the sides and bottom, containing water ballast tanks. They are equipped with pumps generally driven by diesel generators, capable of sucking water into the tanks so that the dock partially sinks, and pumping out so that it rises. They are usually fitted with cranes and other equipment so that once a ship is positioned inside the box, it can be worked on.



Floating dry docks fully emerged, and partially submerged

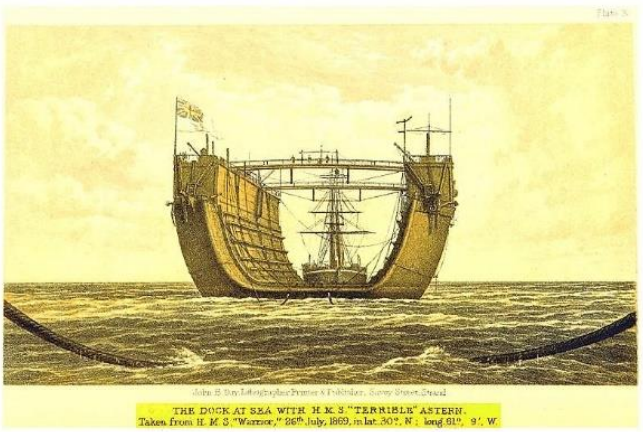
In order for a ship to enter the floating dock, the ship's stability condition has to be ascertained, and its maximum draft noted. The floating dock is ballasted so that the deck forming its bottom is submerged to a depth that can accommodate the ship's draft, with some degree of clearance.

Once the dock is partially submerged, the ship is maneuvered in with the assistance of tugs, and when in position and secured with mooring ropes made fast to the dock, the pumping out of ballast commences. The dock rises in the water until contact is made with the ship's keel; and pumping continues until the ship is high and dry within the box. Work

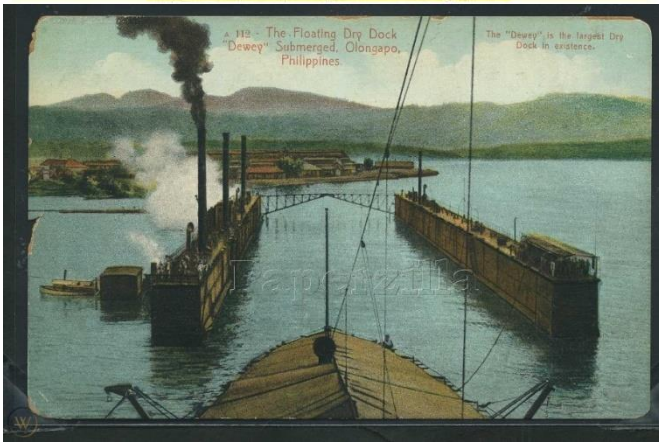
on the ship can then commence. Once completed, the reverse operation takes place; the dock's tanks are ballasted so that the dock sinks until it reaches a depth such that the ship is again floating, and can be maneuvered out of the box.

Ships high and dry in floating docks

The idea is not a new one; here are examples of floating docks from the past:-



HMS *Terrible* in floating dock, 1869



Ship entering floating dock *Dewey*, Philippines, 1906

But what on earth was a floating dry dock from Swan Hunter's doing on the west coast of India? The story really starts at Wallsend, Newcastle-on -Tyne…..

NEWCASTLE, ENGLAND

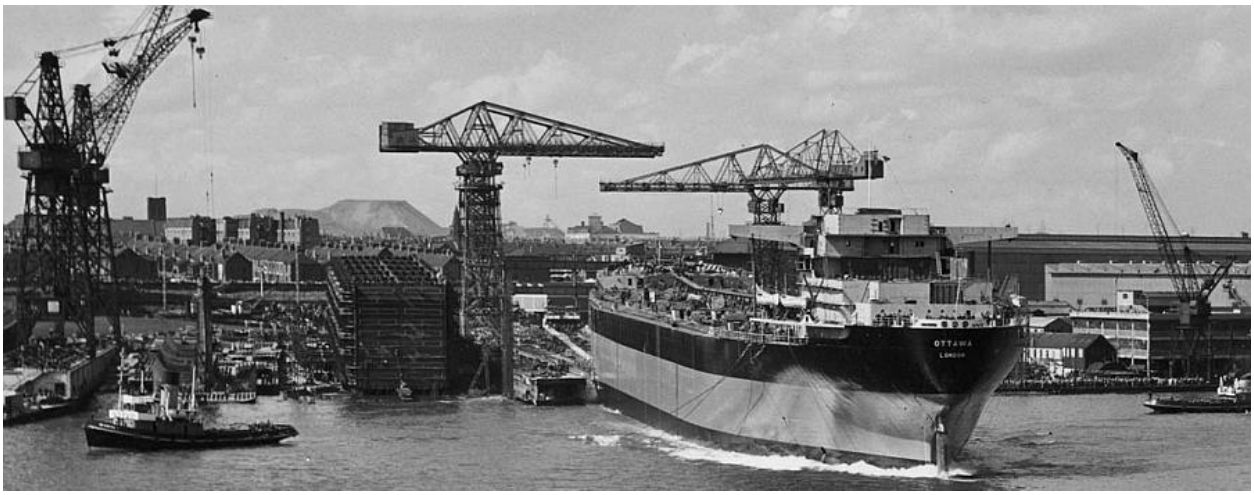
THE SWAN HUNTER SHIPYARD – DECLINE AND FALL

Swan & Hunter was founded in 1852 by George Burton Hunter, who formed a partnership with the widow of Charles Sheridan Swan, the owner of a Wallsend *[so called as it was the eastern terminal of the Roman Hadrian's Wall]* Shipbuilding business.

In 1903, C.S. Swan & Hunter merged with Wigham Richardson to bid for the contract to build Cunard's RMS *Mauretania*. Their bid was successful, and the new company, Swan Hunter and Wigham Richardson Ltd, went on to build what in its day was the most famous oceangoing liner in the world. *Mauretania* was launched from Wallsend on 20 September 1906.

RMS *Mauretania* under construction and launched at the Wallsend shipyard

For years, the massive ships under construction at the Wallsend yard dominated the skyline….



Tanker *Ottawa* launch, Wallsend shipyard, 1964

***World Unicorn*, built at the Wallsend shipyard, 1973.**

In 1966 Swan Hunter & Wigham Richardson merged with Smiths Dock Company to form Associated Shipbuilders, which later became Swan Hunter Group which was nationalised in 1977 as part of British Shipbuilders. HMS *Ark Royal* was built at Swan Hunter, entering service in 1985.

HMS *Ark Royal* under construction at the Wallsend shipyard

The Company was privatised again in 1987 but was then forced to call in the receivers when the UK government awarded the contract for HMS Ocean to another company, Kvaerner Govan, in 1993. The main shipyard in Wallsend was bought out from receivership by Jaap Kroese, a Dutch millionaire. The yard subsequently undertook several ship repair and conversion projects.

In 2000 Swan Hunter was awarded the contract to design and build two ships for the Royal Fleet Auxiliary. The cost was to be £210 million with a delivery date of 2004. By 2006, the costs had risen to £309 million and only one ship had been delivered. As result of this, the second ship was transferred to BAE Systems Govan in Glasgow for completion.

Over the decades, the Company owned three main yards: The Neptune Yard at Walker-on-Tyne inherited from Wigham Richardson (opened in 1860 and closed in 1988); The Wallsend West Yard at Wallsend inherited from Charles Sheridan Swan (opened in 1842 and closed in 2006); the Naval Yard at High Walker inherited from Vickers-Armstrongs (opened in 1912 and closed during the 1980s). All three were on the north side of River Tyne.

In November 2006, after the failure to complete the second RFA ship, Jaap Kroese announced that the business was effectively finished and placed the Wallsend Yard's cranes up for sale. In April 2007, Swan Hunter's cranes, along with its floating dock and masses of other equipment, were sold to Bharati Shipyards Limited, based in India. The entire plant machinery and equipment from Swan Hunter was dismantled and transported to India over six months to be rebuilt at Bharati.

(Sources: Wikipedia et al)

VOYAGE

TRANSPORT TO INDIA FROM WALLSEND

After the sale to Bharati Shipyards of India, through 2008 Swan Hunter's Wallsend shipyard was systematically dismantled and its machinery and equipment, ranging from office desks and chairs through workshop lathes and drills, transport, forklifts, storage units – basically, anything and everything that could be shifted – was loaded on to general cargo ships for shipment to Bharati's shipyard site on the Vashishti River at Dabhol, India.

My role in this operation was that of warranty surveyor – that is to say, I attended throughout on behalf of the insurance underwriters of the project, checking the condition of the material and equipment as it was loaded on to the ships, the stowage and securing for the sea passage, and the condition of the ships and that their statutory certification was valid and up to date. It was a long haul job, so much so that I gave up living in a Newcastle hotel and rented an apartment, which was nice as it meant my wife Lesley could join me from time to time. Like me, she grew very fond of the town…

While all this was going on, a lot of attention was devoted to the shipment of the iconic cranes which had dominated the yard for so long. They and their associated equipment and spares, together with a number of flattop barges, were moved into the Swan Hunter floating dry dock which lay alongside one of the spacious berths. The plan was that once its cargo was loaded and secured, the dock would be towed by tugs (so-called "wet tow") to a berth downriver, where it would be loaded on to the deck of a large semi-submersible vessel and shipped on that to India. (So-called "dry tow".)

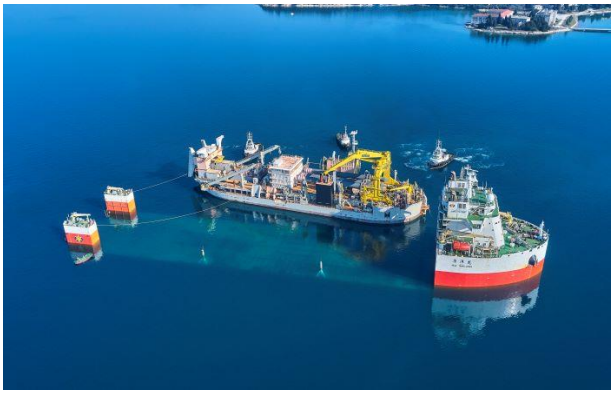
Semi-submersibles – how do they work?

The short answer is, on the same principle as floating dry docks. (See first section above.)

At the time of this project, 2009, most of these vessels were converted tanker ships. They featured a large cut-out area between the forecastle and after bridge, which comprised the cargo deck:

In order to load large units of floating cargo, such as other vessels, construction units, drilling rigs and so on, the semi-submersible would ballast down so that it sank in the water, leaving just the forward and after sections exposed and the cargo deck underwater:

Once this was safely achieved, the cargo to be loaded – in this case the Swan Hunter floating dry dock, in turn laden with the cranes and other pieces – would be floated over the submerged deck. (So-called “floatover”.) When in position, the carrying ship would then deballast its tanks, so that the vessel rose in the water and took the weight of the cargo:



Examples of floatovers. Clockwise from top left: a floating dock; a catamaran ferry; a pipelaying vessel.

Examples of cargoes carried on deck. From left: drilling rig; offshore supply vessel.

Needless to say, this operation required detailed planning in order to ensure its safe and smooth execution.

The designated sem-submersible vessel, the *Osprey,* was chartered in and arrived in the River Tyne in February 2009. It was berthed downriver from the Swan Hunter yard, at a wharf with sufficient depth of water alongside to allow for the ballasting down of the ship. Here again, my role was warranty surveyor, one of my tasks being to inspect the ship and its certification.

Osprey

Before ballasting took place, the Osprey's cargo deck had to be prepared for the floatover and placement of the Swan Hunter floating dock. A timber frame (so-called "cribbing") had to be laid very precisely across the deck, to coincide with the frames and other strong points of the floating dry dock, so that when the ship deballasted and took the weight of the dock, the stresses would be evenly distributed throughout.

Once the timber cribbing was in place, it had, to state the obvious, to be secured down with brackets…otherwise when the deck was submerged it would float off!

When all was ready, *Osprey* was ballasted down so that the cargo deck was submerged. The floating dock was towed downriver from the yard, and over some hours was positioned correctly and nudged over the submerged deck by the attending tugs. This was all controlled and overseen by the senior loadmaster, a Norwegian of fearsome reputation named Arne Røed.

Towing the floating dock from the Swan Hunter shipyard

Osprey **cargo deck submerged. Floating dock positioned ready for the floatover.**

In position over the cargo deck.

Once positioned, the *Osprey* was deballasted, rising in the water so that the floating dock made contact and was lifted clear. The floating dock had then to be secured so that it did not shift in a seaway. This entailed welding to the cargo deck a large number of steel brackets, sixty-plus, fitted snugly against the sides of the floating dock.

Steel brackets securing the floating dry dock

***Osprey* deballasted, floating dry dock secured on deck**

Job done, paperwork complete and signed off, I watched the *Osprey* disappear down the Tyne in the early morning mist a few days later. Its voyage would take it down the UK east coast, through the English Channel and later the Mediterranean, the Suez Canal and the Arabian Gulf, to the west coast of India and its destination, off the mouth of the Vashishti River.

The voyage took about two months, and on 4 May 2009 I flew out to Mumbai to travel down to Dabhol on the Vashishti, to meet with *Osprey* offshore in order to witness the offloading of the floating dock and its wet tow to the Bharati shipyard a short distance upriver from Dabhol. Again, I had been appointed as the warranty surveyor for this operation.

The first action was to remove the sixty-odd steel brackets which had held the dock secure during its voyage. This took a couple of days. Then the offloading, (also known as the "floatoff") was delayed for a time as the wind had blown up and rough seas were experienced. I was put up on *Osprey* in a spare cabin. On 7 May, conditions were calm enough for the loadmaster, Arne Røed, to agree to declare the green light. Mooring ropes were secured to the dock, led to *Osprey*'s winches, in order to control the dock as it floated.

The ballasting began before first light, while tugs attended and made fast to the floating dock while it was still secured. The *Osprey* steadily sank until the cargo deck was submerged and just the forecastle and stern sections remained above water. The tugs took the weight as the floating dock attained buoyancy and stirred under the control of the securing ropes. Once it floated, the tugs carefully towed it clear and the ropes securing it to *Osprey* were let go.

The floatoff was completed in the late morning, and the wet tow to the Bharati shipyard site commenced. From the offshore location, to 2 kms above Dabhol, the tow took about

three hours. Together with a number of other personnel - surveyors, pilot, dock crew and suchlike - I was riding on the floating dock and trust me, in ambient temperatures of over 30ºC, that steel structure with all the steel equipment that it was laden with, got very hot indeed.

The wet tow in the Vashishti River on passage to the shipyard

The floating dock was fast in a temporary berth alongside the Bharati shipyard wharf in the late afternoon. The villagers of the mainly rural and peaceful river valley now had a new skyline – the big dock and the towering cranes it carried.

Floating dock fast in temporary berth, Bharati Shipyard

From now on, the shipyard would grow, producing ever larger ship structures, and the machinery and equipment brought from the Tyne would contribute to that growth.

Floating dock and cranes in operation subsequently

A famous piece of industrial England had been transplanted, lock stock and barrel, to a new and exotic location.

Brian Cushing

West Farleigh

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