

The continuation of traditional boatbuilding in Cam Pha, Sam Son and Cua Lo, Vietnam

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Abstract

This paper will describe recent and current construction activity on three separate building sites, one each in Cam Pha (near Halong City), Sam Son (near Thanh Hoa), and Cua Lo (near Vinh). The three sites produce boats generally in the Northern Vietnamese/Chinese tradition, but with significant differences in both design and construction details and techniques. The designs that will be discussed are all traditional style motor vessels, that is, vessels whose design and style were developed prior to the availability of powerful diesel engines but are now motorized. They include:

- *The Halong Bay “Square Head” boat, a mid-sized utility and fishing vessel that is the dominant wooden boat in Halong Bay in the size range from 18' to about 35'.*
- *The Sam Son large traditional fishing vessel, A 60' class seagoing shallow draft vessel derived directly from a 3-masted lug rigged sailing vessel with a long history in the Northern Coastal waters.*
- *The Cua Lo mid-sized utility fishing boat (works in a number of fisheries), which is the only significant design in use from the small fishing port on the south bank of the river at Cua Lo.*

Key words: Traditional Boatbuilding Techniques, Cam Pha, Sam Son, Cua Lo, Northern Vietnam

Background

Between 2005 and 2013, I have made a total of 8 trips to Vietnam, totaling about one year accumulated time in country, or in nearby Laos and Cambodia. My purpose has been to document the continued building and use of wooden fishing and freight vessels along the coast and up the Mekong. I have made repeated visits to certain specific boat building sites and boatyards. Among these are three in particular in northern Vietnam. Many of their techniques are very similar and the boats they build have much in common. The three sites, Cam Pha (23 km north of Halong City), Sam Son (near Thanh Hoa) and Cua Lo (near Vinh), are all within a distance of 300 km along the northern coast. Though they have other commercial interests, all three are vigorous fishing towns.

Although epochal changes in technology can lead to radical changes in boat building and design (availability of steel saws leading to readily available planking for example, or the introduction of inexpensive diesel engines leading to broad transom sterns) my expectation is that a thorough knowledge of the surviving traditional construction techniques and vessel designs will provide significant insight into the origin and perhaps age of shipwrecks and on-shore remnants of older vessels.

The common boat building techniques and the similarities of design characteristics of the boats built in the three towns described can be summarized as follows:

- The planking is edge nailed from plank to plank
- The primary fastenings are black iron, hand forged square spikes and commercial bolts and nuts.
- The boats are built right way up on a single central plank, with one or both ends bent up to serve as stem and stern post.
- If a separate stem timber is used, it is bolted directly to the central bottom plank, effectively replacing the bent up bottom plank's function.
- The wood is bent when necessary by heating it over a slow fire and bending the plank with weights or levers or both.
- Although all three boat designs are more or less descended from sailing ancestors, they are all pure motor boats today.
- They are usually built to ground readily, with hoisting rudders and flat (but rockered) bottoms that keep their props mostly off the bottom.
- The boats have long overhanging bows, and their lines are long and easy, with very few sharp bends in the planking.
- Two of the three are, in effect “5-plank” boats with two chines each side. That is, they have the flat bottom “plank”, sloping bilge “planks” and near vertical side “planks”, though each “plank” will be made of a number of individual pieces.

Cam Pha

When I first became aware of the building site on the derelict beach below the town of Cam Pha in 2005, one old man with a crew of up to eight men and women was building

two different sizes of the typical “Halong Bay Squarehead” utility vessel. These boats are traditional both in their overall style and in the manner of their construction. Their defining characteristic is their odd (but very useful) square foredeck. They are commonly built in lengths from 20' to about 40', the smallest having no cabin other than a small box or a deck over the engine and perhaps an arched canvas cover over the hold. The larger sizes have substantial houses built at deck level over their engine areas.



1 *Fig. 1 Cam Pha Construction Sequence, 2005 – 2012. (Ken Preston)*

The building process of the traditional “squarehead” boat (Figs. 1 and 2)

- The central plank is tapered at the forward end then bent sharply upward at each end by heating over a slow fire while forcing one end of the plank down with weights. More recently, a separate stem timber is bolted to the forward end of the central plank and the aft end is bent up as before.
- The central plank is set up, with props at bow and stern to support the ends and bolted down to deadmen set in the sand.
- Planks are added to the boat in pairs, port and starboard, by edge nailing with

hand forged square boat spikes about 5" long x 1/4" thick. The plank is first offered up and the inner edge marked to follow the previous plank. The builders use large wooden clamps, chains and prybars to hold the plank in position while it is marked and fastened.

- The upper edge of the new plank is marked to utilize the available wood while achieving the hull curvature the builder has in mind and the plank is sawn to shape.
- It is offered up a second time to check the sawn shape, and at that time the two adjacent plank edges are marked for spike locations at about one foot on center. The "new" plank will be chisel cut to produce a V-shaped tapered opening into the interior of the plank at each nail location, then the plank will be braced on edge and a nail "guide hole" drilled from the center of the plank into the chiseled entry.
- The plank already on the vessel will also be drilled, from the marked nail location straight into the center of the plank.
- With both the old and new planks drilled for spiking, the new plank is offered up one more time and pried into position with clamps and pry bars while it is nailed off.
- If all goes well the spikes will be driven home using a punch to drive them into the chisel cut slots into the face of the plank. If there is trouble with the fit up, the spikes can be withdrawn with the same punch, catching under the hooked head of the spike, the correction made and the plank finally fastened off.
- These boats are not 5-plank boats; they are a simple round bottomed shape. At the turn of the bilge nothing is done differently, except that the new plank is pried up to match the builder's idea of the correct angle. Usually, with one plank above the bottom in place, a floor timber will be added amidships, chopped to the angle with a balance-hatchet and spiked in place. A similar timber will be placed to form the lowest member of the future transom stern.



Fig. 2 Cam Pha Construction Sequence, 2005 – 2012. (Ken Preston)

- Thereafter, the sides are raised with at most a few additional floor timbers and a futtock or two to help hold the growing hull together. The wood used at Cam Pha is generally dreadful, full of knots and checks, and sawn relatively thin. The fit up of the plank seams is quite casual. The builders rely heavily on good caulkers to make their boats water tight.
- At the top of the lower portion of the hull, a doubly thick but narrow plank or “wale” is placed full length each side. By this time the stem and transom are both well established and effectively locked into place by the planking and the wale.
- A cross-timber is added at the top of the stem, extending out to the sides to mark the extent of the foredeck and provide a landing for the forward end of the sheer plank (which is twisted sharply through nearly 90 degrees to land flat on the cross timber) and the filler pieces that bridge the wide gap in the planking under the foredeck.
- Aft, the wale continues on past the lower transom and defines the lower edge of the upper transom. This was originally a common feature on Chinese sailing vessels, on which the upper, outer transom provided some protection to the

rudder (hanging on the lower transom) in following seas. Nowadays the rudder is often a typical steel plate motorboat's rudder, positioned deeper under the hull in the prop-wash.

- Since the sheer plank tumbles home a bit aft and rolls out nearly 90 degrees forward to form the squarehead, it is always fitted in at least two pieces, scarfed about amidships.
- With the planking finished (or nearly so) the balance of the framing is fitted into the hull, using all sorts of rough pieces of timber, sawn to gentle curves, beveled to fit with the balance hatchet and spiked into place with boat spikes. Here and there the hull, as originally planked, won't suit the builder's eye and he'll bore a hole through plank and frame for a bolt, which will be used as a clamp to force the planking into place against the frame.
- Very different from Western practice, the floors and frames do not usually overlap much if at all, and may not even touch each other.
- With the planking complete, in the older model, a false stem was fitted over the hood ends of the planks at the bow and shaped to a somewhat sharp entry. In the past two years the use of a completely separate stem has become the norm and that stem, bolted to the central bottom plank, is rabbeted in normal fashion as planks are brought to it.
- At some point after the planking is complete to the sheer, the curvature of the plank ends, where they transition from the lower to the upper transom, will be marked by eye with white chalk and cut out with a mallet and chisel.
- With the frames in place and trimmed to height, bulkheads are installed full depth (spiked to the frames and edge nailed plank to plank) at least one at the forward end of the engine area and another at the forward end of the fish hold. Often even fairly small boats are divided into five compartments (lazarette, engine room, fish hold, forward hold, and a space under the fore deck). Often the fish hold will be drilled through the planking to provide a free-flooding wet well for the catch. No doubt the hulls derive a great deal of their strength from the bulkheads, since the frames are not continuous anywhere.
- Deck framing and hatch coamings are installed along with uprights extending

from the floor timbers to the eventual height of the cabin top.

- Decks are laid and cabin joinery completed.
- With the hull construction complete, she's released from her anchorage to the earth and propped up first on one side, then the other for caulking. Since the planks were fitted roughly and tight edge to edge and no caulking seam was cut, it is done by the caulkers as they go along, opening up not only the seams between planks but also the checks and splits in the planking. Quantities of waste fiber are driven into the seams and splits, trimmed with a chisel, and troweled over with a gray mastic for sealant.
- At that point the vessel is ready for power and outfitting for her work and is routinely put overboard on a high tide and towed away to have her engine fitted elsewhere.



Fig. 3 Cua Lo Construction Sequence, 2005 – 2012. (Ken Preston)

Sam Son (Figs. 3 and 4)

Although the boatyard in the river mouth north of town does significant new construction of various sorts, for this paper we will only consider the construction of large traditional vessels on the beach in front of town. They are built on a single very long bottom plank

bent up at each end to form the stem and what amounts to the central plank of a narrow transom stern. They are fastened with hand forged square boat spikes and commercial steel carriage bolts. Since I have not seen the entire building sequence, some points can only be surmised, but in general:

- The bottom (which comprises the “bottom plank” and the two “bilge planks”) is built complete in one piece lying on coconut palm trunks that are set to support the line of the bottom rocker, on sand bags a foot or so above the beach. The bottom planking is bolted through the floor timbers (which do not extend past its edge) but a number of edge nails are also used.
- The entire side “slabs” are edge nailed together and cut to final profile flat on the beach. When I arrived to see one of these boats at this stage, the port side was complete and lying flat on the sand alongside the completed bottom, with its stern quarter region already bent into a sharp curve upward. The starboard side was not yet complete forward, additional planks were being offered up where the slab lay in the sand, but the stern quarter area was already in the midst of being bent up over a slow fire. This is the only example I have seen of bending the slab upward by levers rather than downward with weight, a concession to the size of the completed sides, which are massive, with planking nearly 2” thick and require a number of planks edge nailed and scarfed lengthwise.
- Unlike at Cam Pha, these heavy planks are not repeatedly offered up and marked, cut, offered again, marked again, drilled, offered again and finally nailed. Rather they are offered only once on the sand, cut to shape with a circular saw, and edge nailed directly where they lie. The chisel cuts to provide an entry for the spike are the same as at Cam Pha but the hole is drilled from the chiseled opening into the two planks. Since the drill cannot bend to run cleanly into the center of the old plank as it effectively does at Cam Pha the drilled hole necessarily is aimed toward the far side of the plank. A small bend is placed in each spike before driving and most of them stay within the planking. Only now and then does one break out to the surface of the side.



Fig. 4 Cua Lo Construction Sequence, 2005 – 2012. (Ken Preston)

- With the sides nearly complete but lying flat on the sand on either side of the hull, a single temporary mold is erected and braced off amidships.
- In the course of a long day, the sides are raised into position on the bottom, wrapped around the temporary mold and fastened off to the bottom and the raised stem and transom sections of the central plank. The process requires about 20 men to pick up the sides one at a time and temporarily hold them generally in place with rope, chain and chain falls. But the rest of the day's effort only involves eight to ten men, slowly urging the side slabs into contact first with the transom portion of the center plank, then bit by bit with prybars, chain falls, large wedges and brute strength, bringing the chine together full length. The chine fasteners are carriage bolts roughly 1/2" x 10", driven into drilled holes through the side and into the edge grain of the bottom on approximately one foot centers.
- Thereafter the futtocks (side frames) are cut and fitted, one pair per floor timber, but not necessarily in contact with the floor and not normally bolted to it. In some

examples I've seen the futtocks are deliberately spaced between the floors. The futtocks are shaped like hockey sticks, sawn to shape, so that the short end of the hockey stick projects out onto the hull bottom and becomes a primary connection and strength member at the chine. They extend well above the original side slabs to support additional structure.

- Above the sides that were erected in one piece, a thicker plank or wale is wrapped around the frames. Bulwarks are raised a further foot to 18" and given a rail cap, which is often armored with a smoothly welded stainless steel cover to help prevent hangups of the fine web used in their nets.
- Aft, three or four beams are let into the top plank of the original sides and are used to extend the deck substantially to each side, with the bulwarks boxing in a comfortable aft work deck. This gives the boat a peculiar appearance aft, with a large boxy aft deck area above the shapely quarters.
- The rudder lowers through a trunk extending from the aft deck through the bottom, and the whole aft compartment is left free flooding and not even caulked. A tight bulkhead between the rudder compartment and the rest of the vessel may be the only tight bulkhead. Other bulkheads may be added, but in many cases the hull is effectively open from end to end.
- A centerline hatch runs full length of the fore deck, covered with loose hatch covers that apparently are never dogged down.
- The "pilot house", if any, is low, providing only sitting headroom, and may be non-existent, the engine house covering the engine but not offering crew quarters.
- As recently as the 1990's these boats were rigged with three masts and three lug sails and provided with a Chinese style daggerboard working vertically in a trunk, but none of them carry a rig today and there is no sign of the daggerboard.

Cua Lo (Figs. 5 and 6)

The small fishing boat harbor in the creek at Cua Lo is remarkable in that all the resident boats are the same model, ranging in size from about 25' to about 50' overall length. Before my visit in late 2012 I had not seen any of these boats under construction, only hauled for maintenance. In late 2012 there were two new boats

about 35 feet long standing partially framed and planked in the yard on the south bank nearest the mouth of the creek.



Fig. 5 Sam Son Construction Sequence, 2005 – 2012. (Ken Preston)

At that time one was clearly a week or two further along than the other, which immediately gave some indication of the sequence of building. I was able to examine them in detail at that time and again about one month later. More recently, in late 2013 the same small yard had three boats under construction spaced a couple of weeks apart, from a bare bottom going together to a nearly planked up vessel. Between these three visits we have essentially complete documentation of the building sequence.

- The boats are built on a central plank which is bent up aft to form the run, leading to what will be a broad, but narrow (top to bottom) planked transom in the finished boat.
- A separate stem timber is bolted to the bottom plank and rabbeted for the planking. The first three or four floor timbers swallow the stem.
- The floor timbers are cut to the profile of the bottom and the planks are bolted to them, rather than being edge nailed without benefit of frames. Fastenings in

general are bolts, not spikes. The boats give the impression of being round bilged from outside, but they are actually multi-chined, with hard chines as well as an arced bottom. The planking is very thick and probably planed to relieve the sharp corners outboard. The planks are definitely planed to remove scars from flame bending.

- Sawn elbows are bolted to the floors, and the futtocks in turn are bolted to the elbows, forming a typical western-style complete frame. However, only a few frames are completed before the planking is advanced further. The hard chines are formed by sawing the angles into the floors and futtocks, not by making each futtock straight and splicing the frame with gussets.
- Rather than advancing the planking piece by piece, when the turn of the bilge is reached a separate plank is placed above the next chine angle to stabilize the frames and apparently also to provide a guide for building subsequent frames. Great care is taken with fitting each plank and the plank seams are routinely nearly perfect.
- The boats have a great deal of rocker and the stern is built broad and flat, which forms a very easy long run. Individual planks at the stern are allowed to run wild for most of the construction.
- The slot and framing for the rudder trunk are placed early in the bottom construction. Since the harbor partially dries at low tide all the boats have hoisting wooden “barn door” rudders.
- Perhaps unique to this design, two futtocks on each side up forward are made of massive timbers, and project well above deck and bulwarks. They will support a cross timber which will support the long booms which the local fleet uses to push a net ahead of the boat.
- To provide more working deck aft, the next to last topside plank is rolled out from plumb to nearly horizontal and extends the beam a few inches each side, thus producing a small reverse knuckle in the topsides aft. Alternatively, two or three cross beams may be let into the sides and the aft deck planked over them to provide yet a wider work area aft.
- The final topsides plank lands on top of the timber that all the previous bottom

and side planks had been bolted to and becomes the bulwarks of the cockpit and the working deck forward, but also the lower sides of the engine house or cabin midships.



Fig. 6 Sam Son Construction Sequence, 2005 – 2012. (Ken Preston)

Summary

The primary techniques of the northern Vietnamese boat builders, flame bending, edge nailing, building the bottom on a single central plank and raising the sides on the bottom (whether in one piece, or plank by plank) are consistent along the northern coast of Vietnam but those techniques allow for construction of a wide range of boat types. Thus, even if the style of boat changes (e.g. from sail to power) the building techniques will still provide a “signature” which may be useful in identifying their origin.

Biography

Ken Preston was born in 1946, took a degree in Geology, and served in the US Army in Vietnam. He went commercial fishing off the US West Coast until he went broke, then pursued a career in marine construction (harbor works, bridges, docks, dredging, breakwaters and so forth). Ken held a license as a tug boat operator for a period of years, but only worked on boats locally on construction projects. Since 2005 he has spent six weeks to two months each year traveling in Indochina, documenting the remaining traditional (primarily wooden) fishing and freight boats of the region.