

The Classic Yacht Symposium 2010



The Restoration of Coronet Phase III

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RUTHERFORD'S BOAT SHOP

INTRODUCTION

Two years ago we published, for this symposium, a discussion on the strategy that was being considered for the initiation of the restoration of Coronet. The team is in the early stages of executing that strategy. In reality, this is Phase III of this project. The first phase was the acquisition of the project by IYRS. The second phase was the disassembly of the interior and transporting of Coronet from the water to the building where she now resides.

Our goal in this project is to restore Coronet as an active sailing vessel. We will use as much of the original fabric as possible. In its current condition, the topside planking and the frames are completely rotten. The interior is in fairly good condition and much of it will be saved; knees and bottom planking are all to be determined. The yellow pine ceiling planks appear to be usable. There is a great deal of rigging pieces that appear to be sound and will be reused if that observation is confirmed. She will have no engine, as was the case when she was launched in 1885. She will be rigged largely in the same manner. We do not plan to use winches other than those shown in photographs of Coronet (halyard winches). There will be no electricity on board so oil lamps and ice will be used. It is likely that we will use stainless steel for the drinking water storage and naturally we will abide with the laws regarding contained black and grey water. The rest of the picture will be largely the same as it was in 1885.

In general the initiation of Phase III began mid 2009 when Chris Morrison and Eric Thesen came aboard. Each of these gentlemen brings many years of ship building experience to the project. Each has over 10,000 hours of apprenticeship experience. Eric's family had a business in South Africa which built large frame fishing boats hence experience in this process. Chris was a lead shipwright on the restoration of Joyant and both Chris and Eric were involved in the restoration of Cangarda. Rutherford's Boat Shop has been employed in the restoration of wooden boats for the past 32 years. Our work includes many successful projects, including Cangarda and Joyant both have previously been presented at this symposium.

SETTING UP SHOP

Coronet was placed in a 70 x 200 foot new Steel framed building, engineered, bought and built for Coronet. It has a dirt main floor with a steel and plywood mezzanine level 15' above the main floor. The mezzanine surrounds the yacht allowing visitors to walk around the entire perimeter. It included a 40' x 70' empty workspace on one end with a 6' wide walkway around the rest of the perimeter. The workspace is now closed to visitors who are now allowed only on the walkway area of the mezzanine. The building had inadequate power supply distribution and no plumbing. Setting up shop involved providing power to individual machines as well as power sources around the shop. A bathroom was installed as well as running water and sewage lines to serve the heated office and lunchroom that we built. We also installed a 25 HP dust collection system. 10" ducting travels around the shop with 6" branches coming off of it to individual pieces of machinery. We built and soundproofed a room around



the main unit.

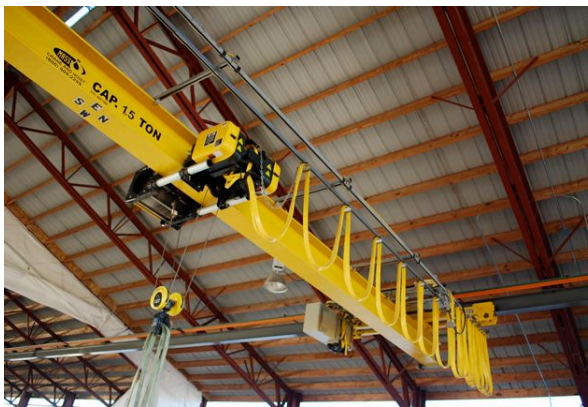
Shop with visitor's mezzanine.

Several concrete foundations were poured on the main floor to support the machinery, which includes a top of the line 1918 Fay & Egan ship saw, a Whitney 30" planer, a Northfield 16" table saw and a Tannewitz 36" bandsaw. The shipsaw, close to one hundred years old, is a beautiful piece of machinery. 48" wheels revolve around the table, which remains level, so that a changing bevel cut can be made. There is both a power drive and a manual wheel to accomplish this type of cut. The table has an integral power feed system. All these functions operate off one main belt with secondary belts for the different functions.



1918 Fay & Egan shipsaw

Our favorite piece of machinery is the 1½-ton bridge crane we installed to handle the heavy timbers as well as completed frames. This crane has already saved us hundreds of hours of hard labor in moving heavy timbers around. Although this crane is the largest one that could be installed in this building, we have had to use a forklift at one end of the timber to assist the crane in moving the heaviest pieces.



1 ½ ton Crane

We also built a 20' x 28' framing table now covered with plywood to be used initially for lofting frames. Later, once the plywood is removed the table will be used for assembling frames. We built this table of 3" x 11" lumber cut from 37' long, 12" x 12" southern yellow pine timbers salvaged from a mill in Fall River, Massachusetts. This framing table will accommodate the largest frame on the boat. The table is built on the mezzanine level of the shop. From here the frames can

be hoisted by the bridge crane to the keel for installation. The table has 1 ½" gaps between the planks to slip a clamp in for holding the frames in position while they are drilled and trunneled together. When framing of the boat is complete, the table will be disassembled and its lumber used for boat parts. The mezzanine level will be converted to a joiner shop.



Framing Table

ACQUIRING MAHOGANY (CAOBA)

One of the most interesting parts of the project was the acquisition of sustainably grown mahogany for Coronet's caprails, skylights and other details. To examine this possibility we flew to Guatemala with two reasons in mind. First we wanted to be sure that this claim of sustainably harvested mahogany was a true claim. Second we knew we would be purchasing enough mahogany to merit close attention to the detail of the material actually purchased to be sure the lumber shipped was of highest quality.

Off to Guatemala with family. This was to be a "vacation". I brought my wife and two teenage children. Bob McNeil, the owner, and his youngest daughter, also a teenager, joined us. It actually worked out well. We flew to Guatemala City and then up to Flores, the location of the sawmill. The first day we visited Tikal, the Mayan City that dominated the region pre-Hispanic invasion times and was truly spectacular. The next day a wake up call comes at 3:00am for all, including the teenagers.

The ride north to the forest of Peten near the Mexican border was five hours over dirt roads in a van with little in the way of shock absorbers or air conditioning. We passed through several Mayan communities as well as Guatemalan military control points, which were set up to keep migrants from burning and poaching the forest, to arrive at the logging camp in the heart the Peten Region. About three hours of the journey was spent driving through mile after mile of burned out tropical forest. These lands had been used for agriculture for a couple of years until it could no longer support any crops at which point the burners moved on burning more forest. The well-known end result is fallow land. As we neared the area of timber harvesting, the active burning was evident. Reforestation is hard to achieve although the history of Tikal suggests that the

possibility exist. When Tikal was an active city the land for miles around it was denuded of forest. After the people of Tikal abandoned their city, the forest grew back, although it took hundreds of years.

As a person who makes his living using the forests of the world it was very distressing for me to see this happening. It gave me second thoughts about using any of these tropical hardwoods. But the harvesting technique that I witnessed the sawmill using under the guidelines of the Forest Stewardship Council (FSC) reassured me that it is possible to use natural resources sustainably. They start with a thorough census of the area. Every tree in the forest is marked on a map and is given a number. The harvesters are instructed by biologist from an outside organization who decide which trees can be cut to maintain the viability of the forest. After a plot is harvested they will not return to that same plot for thirty years. A year after the loggers leave a plot the drag roads are gone, the forest has overgrown the area. The truck roads used by the eighteen wheelers to haul the logs back to Flores cannot be found in five years. Such is the growth of the forest in this warm and moist place.



Cutting one of our mahogany trees for Coronet.



Examination of one of the buttress roots of the mahogany tree for Coronet.



Pieces cut from the natural crook of the mahogany tree.

We selected and cut two trees for Coronet from the Peten forest. The rest of the lumber we purchased was from their inventory of logs. A total of 12,000 board feet. One of the better finds were the natural crooks and 'gambas' (buttress roots) that support the tree which are usually left behind on the forest floor. The crooks and gambas have a curved grain that will be used in the construction of the corners of the cap rail on Coronet. I was able to sit in the sawyer's booth to decide with him how best to cut the logs. Below is a picture of the inventory of mahogany in our shop in Richmond California. Some of these pieces are twenty feet long and two feet wide, 12 and 16 quarter!



Inventory of mahogany for Coronet

This was a convincing trip suggesting that sustainable harvest is possible and that we all must support this effort for our future.

GETTING STARTED, THE HULL

To start the hull we first pulled off topside planking to examine the underlying vessel structure. Question, what could we save? As the picture shows, the rot in the frames was extensive. We discovered many repairs, much replaced lumber, some done well, some poorly. In the end, we believe very few frames or futtocks will be salvageable. Along with the topsides the frames went to dust. Indeed one does not need but a hammer to remove these pieces. The futtocks for the frames of Coronet are constructed of oak, sided 5 1/2 inches and molded 9 inches. She is of double sawn construction, therefore each frame is 11" x 9"; each individual futtock is anywhere from 6 to 13 feet long depending upon its shape and location. In addition to this, the deck beams are nine and a half inches square, some twenty-five feet long. The planking is two and a half inches thick, ten to twelve inches wide and up to forty feet long. The keel timbers are being shaped out of oak that is 11 x 30 inches x 40 feet long. The smallest of the timbers that we are handling in this phase weighs close to 300 pounds.



Topsides removed exposing the frames.

Originally Coronet was built with what is known as long arm-short arm frame/futtock construction. This type of construction takes oak of a size that is no longer obtainable in sufficient quantity. It needs oak in dimensions of 30" to 40" wide. The naval floor construction technique uses natural crook wood floors across the top of the keel. Because we cannot obtain sufficient natural crooks to use this technique, we have decided to connect the frames at the keel using bronze floors in combination with straight wood floors. This was calculated to meet Germanischer Lloyd specifications for wooden ship construction.

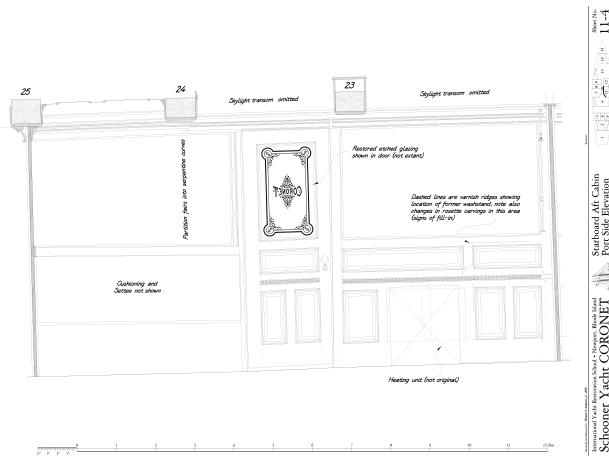
The garboards and broadstrakes were removed for viewing the original centerline structure. We knew the boat was fastened with trunnels but during the removal of these planks, we discovered that it was intermittently fasten with bronze ship spikes. We believe these spikes were used to hang the plank and hold it in position while the trunnels were drilled and installed. The trunnels go all the way thorough the plank, frame and ceiling, 16" long, they are cut flush and wedged on both ends. This is a very strong way of fastening as we learned during the removal of the garboard and broadstrakes. In our effort to take the planks out in one piece, we had to drill out all the trunnels.

The lines plan we are using for the restoration of Coronet was compiled from the original builder's half model belonging to the New York Yacht Club and two sets of measurements that were taken from the boat itself, one was taken by Mystic Seaport Museum and the other more recently by an IMS measurer. These two sets of measurements together with the lines from the model were put into a computer program. The two measurements had the hog removed from them and when faired by the computer proved to be quite close to each other and matched very closely to the lines of the model. Differences between the measurements and model were found in the area forward of the rudder in the tuck. We decided to follow the measurements taken from the actual boat under the belief that the builder diverted from the model. A final table of offsets was developed from this information and Mylar drawings have been generated to be used to make patterns for the frames, the stem, the entire rabbet and to pick up all of the bevels for the frames.

THE INTERIOR

As Coronet was prepared for restoration complete cataloging and documentation of the interior of the vessel was performed by the industrial archaeologist, Richard Anderson, who drew, tagged, and mapped out every piece that was removed during its initial disassembly. We now have a catalog of every drawing he did. In Figure 1 you will see one of these drawings, please note in the upper right corner a plan view of the accommodations in which the location of this piece is shown. Even at this early stage of the project the

development of the interior will be greatly facilitated by his diligent work.



1 of 77 drawings of the interior
Figure 1

The partitions for the owner's cabin and the starboard partition of the main saloon were set up in a separate shop. Continued restoration of these panels, drawers and cabinetry will continue for several years. The overhead, where possible, will also be preserved for refinishing. All the construction of the interior of the cabins is dependent on placement of the deck beams because some of the partitions follow these beams. Hence the work will focus on the restoration of the partition panels and bunk faces without assembling any of these parts. The serpentine wall that was part of the main cabin has been reconstructed using forms and "wobble wood" until final assembly in the boat. The form fits the bulkhead parts from the main cabin very well as seen in Figure 2.



The serpentine wall of the front center of the main saloon.
Figure 3

The serpentine wall that marks the forward end of the main saloon and the entrance to the forward corridor for the owner and guest cabins are roughly set up in Figure 3 above. It is interesting the difference in quality of materials in the different pieces. The frame around the bunk and the panels' that make up the front and foot of the owners bunk are of high quality mahogany.

However some of the panels in the partitions can be made of questionable wood.

The box beams that are set up here in Figure 4 in the rough assembly of the owners cabin, serve to study how the bunk and wall partition pieces fit around the deck beams. The mirror is original and intact. One of the more interesting projects will be assembling the skylights and transom louvers for the cabins. The main skylight ran down the deck for seventeen feet and overlapped the cabins on each side of the hall passageway by about two and a half feet. In this manner the cabins could get fresh air under the right conditions. The transom windows exist but are not in these photographs.



Owners cabin rough assembly to look at the pieces.
Figure 4

CONCLUSION

As we go forward over this next year we hope to complete the framing in an eighteen month period, deck the vessel and begin to assemble the interior beginning in 2011 or so. We feel comfortable about the details of the hull including using, if possible, the original deadwood etc. The owner has offered us a bounty on every piece of original hull material that can be saved! Although he also tells us he plans to take her around Cape Horn so we need to be sure she is able.

We have not yet addressed the mast and rigging although the team has experience in building large spars. All in all a quiet beginning to ensure a sound footing on this great restoration of a great yacht.