

Japanese Boatbuilding

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ABSTRACT

The craft of boatbuilding in Japan is in crisis. Nurtured by an ancient apprentice system, Japan's rapid growth in the post-War years disrupted this tradition. The last century was a pivotal time for this craft: the devastation of World War II forced one more generation to assume the work of their fathers, but the rapid recovery and ascendance of the Japanese economy starting in the 1960's pulled the children of these men into the corporate jobs of a new Japan. In a single generation the apprentices the craft depended on disappeared. Without a new generation of apprentices, craftspeople were unable to pass on their knowledge. Because this was largely an oral tradition, and infused with secrecy, it presents particular challenges for documentarians. It is critical now to document the work of Japan's last generation of boatbuilders. Over the course of twenty-five visits to Japan spanning twenty-nine years I have apprenticed with seven boatbuilders from throughout Japan. In addition, I have traveled to all of Japan's forty-seven prefectures, meeting and interviewing over fifty boatbuilders. My teachers were in their seventies or eighties at the time I studied with them, and I am the sole apprentice for six of my teachers. Most of my teachers used no drawings whatsoever, and worked entirely from memory. Drawings, where they did exist, were left intentionally incomplete. The goal of my work has been to document as much as I can - essentially writing the secrets down - in an effort to preserve the designs and techniques of boatbuilding. In this talk I will review the challenges, processes, and insights I have gleaned from this work.

Key words: Boatbuilder, Teacher, Apprentice, Documentarian, Japan

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INTRODUCTION

As a boatbuilder, writer, and researcher I have been studying traditional Japanese boatbuilding since 1990. My research involves working alongside boatbuilders in order to record and document their design secrets and techniques. Over the course of twenty-five trips to Japan I have built boats with nine different craftspeople. All of my teachers were in their seventies or eighties when I worked with them and for seven of the nine I am their only apprentice. I believe it is not enough to save the objects of this craft tradition; we must save the skills that created those objects.

STOLEN LESSONS: DOCUMENTING THE JAPANESE BOAT



Figure 1: Mr. Masaru Hiromitsu, the last boatbuilder of Kochi City, with his family's plank drawings, in 1992.

On my second trip to Japan in 1993, I met a boatbuilder in Kochi City. Mr. Masaru Hiromitsu was nearing retirement age and, despite having apprenticed with his father, like most traditional craftsmen, he had never taught an apprentice. As he showed me his drawings, all done on planks of wood, he began by sorting them, saying, 'These are my grandfather's drawings, and these are my father's, and these are mine'. A Japanese maritime historian, who brought me to Kochi to meet Mr. Hiromitsu, was whistling in amazement.

I too was initially stunned by the wealth of documentation that was being spread out before us, but looking more closely I saw a problem: the drawings were incomplete. In fact, it was impossible to build a boat from any of them. The builder had recorded the profile of each boat, and a plan view (width) of the bottom plank, but that was all. The drawings did not record the plan view at the chine and sheer, nor the shape of the transom. I mentioned that the drawings shown were unusable without those crucial dimensions. After a pause, Mr. Hiromitsu looked at me and confirmed what I had said. I opened my notebook and asked him what the missing dimensions were. He said, 'I cannot tell you. Those are my secrets'.

Later, over tea at Mr. Hiromitsu's home, I again broached the subject of his secrets. I explained to him that I was living in America and I could never be a threat to his work. In fact, probably no one could be a threat to him; he was the last boatbuilder of the region and his handful of customers were the few elderly fishermen still interested in buying wooden boats. As we talked, it seemed as though he was just then realizing that fact and its implications. Finally, he began to tell me some of the ratios he used in laying down the lines of his boats. More than once he paused, shook his head and said, 'You do not understand how hard this is. It is really unthinkable to tell you these things.'

I think of Mr. Hiromitsu, and other men like him who would later become my teachers, as the Last Generation of Japan's traditional boatbuilders. In the aftermath of World War II, with the country's manufacturing shattered, most of these men followed their fathers' building boats, a craft comprised of mostly small, family-run shops that had been in business for generations. At the outset of their careers, post-War, their tools and techniques would have been instantly familiar to their great-grandfathers in the 1800s. In fact, three of my nine teachers did not use power tools until the mid-1950s, and the rest of my teachers did not get electricity until the mid-1960s.

In 2000, the Nippon Foundation of Tokyo conducted a nationwide survey of those with experience in traditional boatbuilding and listed 214 people. The average age of the craftspeople in the Nippon Foundation's survey was sixty-one. That was twenty years ago. Of the more than fifty boatbuilders I have interviewed only a handful taught apprentices.

My teachers' children, like me all born around 1960, were the first generation to benefit from the enormous boom in the Japanese economy that was underway during their childhoods. By the 1970s mass-produced boats made of fiberglass (known as FRP in Japan) became widely available and began to replace traditional wooden fishing fleets. Three of my teachers went out of business by 1980, while three others were forced to begin building boats in fiberglass or steel. Ironically, only my first teacher, who built the primitive-looking tub boat, remained active until his death in 1999. In the face of their own shrinking opportunities, none of my teachers encouraged their sons to apprentice with them.

After my earliest trips to Japan, I was determined to document the work of at least a few of the craftsmen I had met. But by my third trip I realized that interviewing boatbuilders was a completely inadequate approach. The craftsmen I met had just rudimentary drawings, if any at all. They depended instead on their patterns and memorized ratios and dimensions. Most importantly, they had learned by working alongside a master. How could I pretend to document the complexity of their work via a series of interviews? And then a master invited me to be his apprentice.

This unique opportunity, and my subsequent apprenticeships, allowed me to get inside the craft and record the process of building a wide variety of Japanese boats, from Aomori in the far north to Okinawa in the south. I am particularly fascinated by the methods these craftsmen use to design their boats. This is the heart of the secrecy in boatbuilding, which forced boatbuilders to memorize their designs in very creative ways. The parochialism of Japanese crafts is such that each craftsman's system is unique. In my opinion, recording how they designed their boats is as important as the secrets themselves, and an essential element of the culture of the craft. Therefore, I dispense with Western conventions of naval architecture in my research, and instead document designs using the methods my teachers used. This includes abandoning the standard practice of dividing boats into evenly spaced stations, and using *shaku*, the traditional measuring system.

Shaku is a decimal system with each *shaku* divided into ten *sun* and each *sun* divided into ten *bu*. Far from being obsolete, the *shaku* system is still used by traditional craftspeople and measuring devices in *shaku* are readily available. Most importantly, *shaku* is the system used by boatbuilders throughout Japan. Because boatbuilders use either whole or easy-to-remember values (3.0, 2.75, 4.25 and so on) it is imperative that these be recorded using the same system as the boatbuilder. Converting these systems to metric equivalents obscures the craftsman's ingenuity.

When boatbuilders do leave a record of their work, the information is commonly drawn on a plank of wood. These plans are called *itazu*, or *itazuume*, meaning ‘plank drawing’. Temple and house carpenters also prefer to draw their work on a plank rather than on paper, perhaps because in addition to being a readily available material in the workshop, a plank is also far more durable a medium in a harsh environment. Three of my nine teachers worked from *itazu*; my other six teachers worked without drawings; they relied entirely on wooden patterns with all dimensions memorized instead.

Secrecy is embedded in the craft of Japanese boatbuilding. At the center of this secrecy are the dimensions, angles, and ratios of each craftspeople’s boats. Outside of a family line of boatbuilders, no two craftspeople use the same system for laying down the lines of a boat. In the West there is a standardized system of design that is easily understood throughout the craft, but in Japan dimensions have always been closely guarded secrets. Drawings are usually incomplete, and can often only be interpreted by the boatbuilders who drew them, and boatbuilders’ systems for memorizing dimensions are likewise personal, following no standard rules.



Figure 2: Michinoku Maru, a replica of an Edo-era kitamebune, a coastal sailing trader, launched in 2015 in Aomori.

In 2005 I had the opportunity to visit a shipyard in Aomori where workers were finishing a replica of an Edo-era sailing ship. Michinoku Maru is a near replica of the type of coastal sailing trader that once numbered in the thousands. Four of these replicas have been built since the early 1990’s, all by

one shipwright, who has dedicated the latter half of his career to researching and building these long-vanished vessels. At about one hundred feet in length and one hundred tons displacement, Michinoku Maru's construction was a massive undertaking, involving a team of elderly boatbuilders and shipwrights (average age sixty-nine) gathered from throughout northern Japan. Still, the sole drawing guiding her construction was drawn on wood—in this case a ten- foot long sheet of plywood—which hung on the wall of one of the shipyard's sheds.

In 2003 I saw the extent of the use of *itazu* when my wife and I traveled eight thousand miles along the Japanese coastline, and up several river valleys. The purpose of the trip was to find boatbuilders, conduct interviews, and photograph their work. Our trip ranged from Hiroshima to Hokkaido along both the Sea of Japan and Pacific coasts.

I spoke with over forty boatbuilders. All of these men were elderly and most were semi-retired. One of my requests of each of the craftsmen I met was to see their plank drawings. I discovered that in the center of the country, the regions around Tokyo (known as Kanto) and Osaka (Kansai), most boatbuilders used plank drawings, but as we drove north toward Hokkaido their use dropped off. In the northern end of the main island, Tohoku, and throughout Hokkaido, I did not meet any boatbuilders using drawings. Also, not a single river boatbuilder that I have met to date, over a dozen in all, uses plank drawings, and these river boatbuilders span the entire country from Kyushu to Hokkaido. All boatbuilders are familiar with the tradition of plank drawings, but those who did not use them told me they built their boats *kan de*, or 'by intuition'. At best these latter craftsmen were guided by designs passed down from their teachers, a few patterns, and their memorized dimensions.

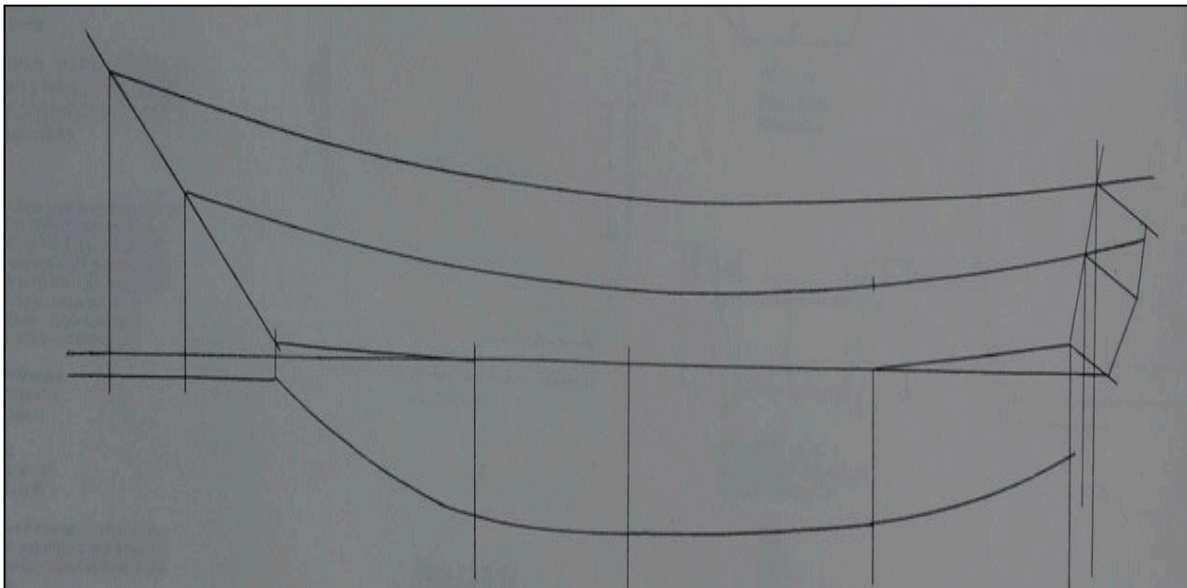


Figure 3: Mr. Nobuji Udagawa's plank drawing of the bekabune, a seaweed gathering boat from Tokyo Bay.

Plank drawings are always, in my experience, drawn to 1/10th scale, and consist of a profile view of the boat showing the bottom, sheer, and chine, and a plan view of some lines. This is my teacher's drawing of the *bekabune*, a seaweed gathering boat we built in Urayasu on Tokyo Bay. It includes a profile view, a half-breadth plan view of the bottom plank, and an expanded transom. Some boatbuilders also record the angle of the bottom plank at one or two stations. Lines are always to inside of planking. Even with this information one could not build an exact replica from most of these drawings; here a builder would need the half breadths at the chine and sheer to have enough information for a replica. It is very rare to find a boatbuilder whose plank drawings are complete. The missing information on these drawings is sometimes recorded elsewhere (in some cases on the back of the drawing) but most often it is memorized by the boatbuilder. This information is the missing key without which the drawing is basically unintelligible.

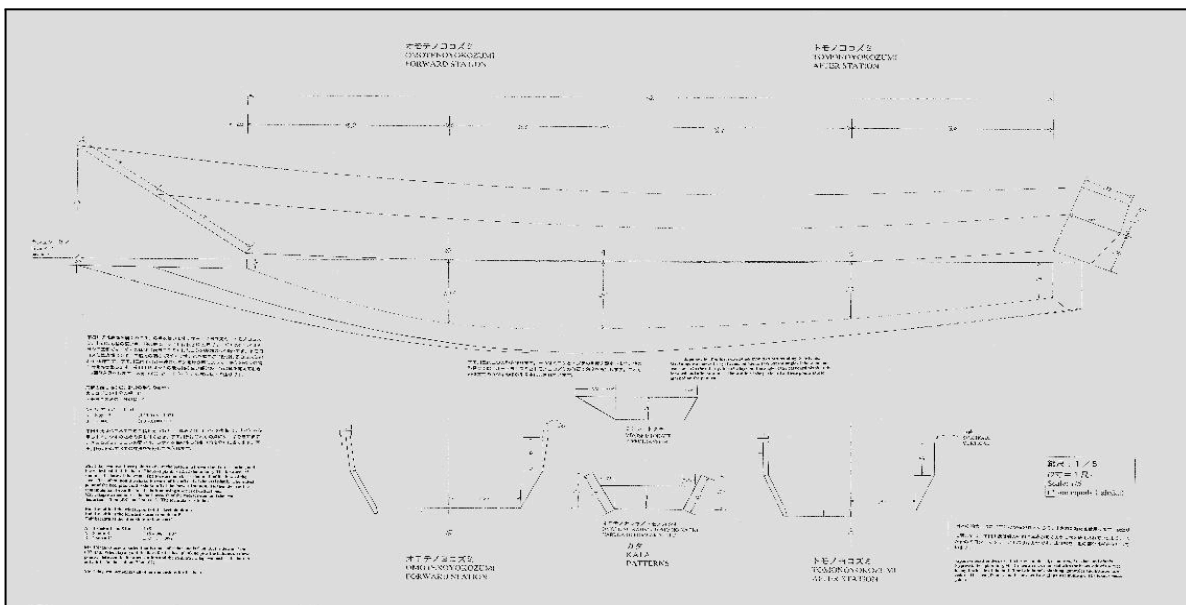


Figure 4: The author's drawing of the Urayasu bekabune, built with Mr. Nobuji Udagawa in 2001.

Here is my drawing of the same boat. I include the missing chine and sheer in the plan drawing. I also record the patterns we used to set the angles of the stem, transom, and planks. I also describe how my teacher memorized key dimensions by deduction, using a starting value and common subtractors. Interestingly, my teacher told me each time he finished one of these boats he burned the angle patterns.

The typical drawing has just two or three cross sections. Even the largest boats I have built, upwards of thirty feet in length, are built using no more than three stations between the stem and transom. Stations are not evenly spaced as is the convention in the West. The middle station is generally located at the point of maximum beam (width) of the vessel. The two other stations, fore and aft, are located at a critical point derived from the boatbuilder's experience, or perhaps a convention passed on from their master.

The small number of stations may seem odd, but it is important to remember these boats are built with much thicker planking material than Western boats for a given length, and the width of individual strakes is much wider. There is a corresponding limit to the amount of hull shape a builder can achieve working within this tradition. Also, most boatbuilders represent the end of long family traditions, in some cases stretching back several generations. The methods for laying down the lines of a boat have been refined to the point of maximum simplicity.

Another common convention in plank drawings, almost certainly due to the heavy reliance on memorization, is that the forward and after station locations are symmetrical. Because the plank keel is the basis for the layout of the boat, the forward station is located by measuring aft from the base of the stem, while the after station is located by measuring forward from the base of the transom. Over and over again I have seen boatbuilders use the same dimension to locate these two points, though of course the value of that dimension varies between builders.

In the West, lines drawings are accompanied by construction drawings, which provide details of construction and the dimensions of all important components, such as the backbone, keel, planking, and framing. Plank drawings almost never contain any construction details; at best they might show beam locations.

For the reasons described, the plank drawing presents a decidedly mixed bag for the researcher. Ultimately the drawing and the craftsman who drew it are inseparable, since the builder is the only person who can interpret it. Plank drawings have been collected, sometimes by the hundreds, by museums throughout Japan, but it is an unfortunate irony that most of them are at best just a partial documentation of a boat.

Another challenge is that the 1/10th scale of these drawings necessarily creates a certain amount of inaccuracy, since it is too small to scale dimensions with absolute accuracy. Even the finest inkline presents a large margin for error when scaled full-size. My two teachers on Tokyo Bay used their plank drawings as a starting point for construction and then as a rough guide as we built. Working with Mr. Udagawa building the *bekabune*, the drawing was mostly an exercise in showing me how it was used, since he had built over three hundred of these boats in his career. After introducing me to the drawing I never once saw him refer to it in the course of our work; he had long ago memorized all the information we needed.

Mr. Fujiwara and I built an Edo-era *chokkibune* he designed specifically for our project, so we referred fairly often to his drawing. But as the boat took shape we used the drawing less; it became more important to make things fit rather than slavishly follow a design. This actually caused some trouble at the end of the project. After the project I decided to loft, full-size, the *chokkibune* we had just launched. I used the dimensions I had taken from the boat, so my full-size drawing represented the boat *as built*. When Mr. Fujiwara saw the lofting he told me that I had made several mistakes regarding some of the dimensions on my lofting. He insisted they were wrong, and he kept referring to the dimensions as he had scaled them off his original drawing. What he didn't realize was how much some of these dimensions had changed in the process of building the boat and fitting the planks. Trimming, beveling, and fastening had significantly altered the shape of the boat. For me it raised the question of whether I should record the boat's shape as Mr. Fujiwara drew it, or as it actually existed?



Figure 5: The author and Mr. Kazuyoshi Fujiwara built an Edo-era chokkibune in Tokyo in 2002.

My argument with Mr. Fujiwara over dimensions made me recall something he had said to a newspaper reporter in an interview right at the outset of our project seven months earlier. In describing how he designed and built boats he told the reporter, as an afterthought, ‘All in all, Japanese boatbuilding is really quite primitive.’ In a way he was right, though ‘primitive’ has a connotation that is not at all fair to the overall level of skill and refinement of technique embodied in the craft. Japanese boatbuilding might be better described as improvisational: drawings are the starting point, but the builder ultimately relies on their eye, experience and skills to get the boat right. My two teachers who used drawings only followed them to a certain point in the process. Beyond that, intuition and experience guided them.

It is important to remember just a few generations ago, at the twilight of traditional boatbuilding in the West, craftsmen would have used systems as ad hoc and individualized as Japan’s last boatbuilders use today. A builder of peapods on the coast of Maine, for example, would have carved a half model, scaled off their mould shapes, and more than likely would not have lofted the lines full-size. Once they had a mould setup they might have done nothing more than shift the distances between moulds to build peapods of different sizes. The efficient builder would have also made patterns for almost every part of the boat, as well as jigs to speed up production. Each of these methods and improvements would have been personal, and unknown to another boatbuilder working elsewhere.

My primary role in the workshop has been as an apprentice: sweeping, fetching tools, and sharpening, until my teachers had confidence in me to let me work on the boat itself. All the while I have had to also focus on writing down dimensions, taking photographs, shooting video, and taking notes on what I see. As a westerner, the biggest shock was being told no speaking was allowed in the workshop. This reflects the basic tenets of apprentice learning; namely, the apprentice must learn by observation. It is not an ideal situation for a researcher, however, but I was given no choice. I have been forced to become incredibly attentive to my teacher’s every move in order to make sure I do

not miss anything. In Iwate at one point in the project I saw my teacher take a bevel gauge and walk to the wall of the shop. He held the tool against a beam, then turned back to the boat. Had I been glancing even for a moment in another direction, or engaged in a task, I would have missed what he had done. When I walked over to the wall I saw a strange shape sketched in ink. Later, I asked my teacher about this and he confessed that all the angles necessary to build the boat were recorded in the figure drawn on the beam. In the course of working with him I would learn that all the recorded information about the boat were in fact drawn on the walls of the workshop.



Figure 6: Angles drawn on the wall of the shop, used by Mr. Hiroshi Murakami in building the isobune in Iwate.

At the time of my first apprenticeship on Sado Island in 1996 I spoke only the most basic Japanese. One advantage of the silent workshop was that I did not need language because my teachers were not interested in explaining anything to me. Later, as my Japanese improved, when I did ask questions the usual answer was simple *mite wakar* ('watch and you will understand') or *matte wakar* ('wait and you will understand').

All of my teachers supported my research, yet each expressed strong doubts about the efficacy of publishing the results. I can understand their hesitation. Apprentices learn via obedience, observation, trial, and repetition, all under the direct tutelage of a master. Mature craftsman who dedicated six years of their lives to an apprenticeship, and then a lifetime mastering their craft, are not likely to believe that all they knew could be recorded in a book. This system nurtured Japan's last generation of boatbuilders, who cannot imagine any other way the craft can be transmitted. My teacher in Okinawa regularly pointed to my camera and notebook admonishing me, saying that while recording his work was fine, I had to 'train my eye'. In the Japanese context, what we call 'learning' might better be called a 'practice' - in the sense that religious devotion or meditation is a practice. The knowledge is visceral and unconscious; not rational nor reducible.

CONCLUSION

The intuitive nature of crafts is deeply ingrained in the Japanese cultural psyche and, in my experience, researchers have shared boatbuilders' views regarding documenting the process. This has left them treating the boats as artifacts, divorced from the skills that created them. Despite several major museum collections of historic boats, I have found almost no research on the techniques of the craft itself. What documentation does exist has been done by just a handful of individual researchers documenting local boatbuilders. I know of no researchers who have actually worked side-by-side with craftsmen, as I have done.

The master-apprentice relationship, which successfully sustained traditional boatbuilding for hundreds of years is, in fact, a very fragile loop. Missing just one generation of apprentices, the craft now finds itself in crisis. I do not presume for a moment that my published work can substitute for a six-year apprenticeship with a master craftsman, but I feel the situation today leaves us no other choice. My first book, *The Tub Boats of Sado Island; A Japanese Craftsman's Methods* (Brooks, 2003) was published as a direct response to the untimely death of my first teacher. He was the only professional builder of tub boats and I was his only apprentice. I am proud to say this volume became a textbook for a series of tub boat making workshops on Sado Island, and a new professional builder has emerged who has told me he learned entirely from my book.

I am currently working with The Apprenticeship (www.apprenticeship.org), America's oldest boatbuilding school in Rockland, Maine, on a boatbuilding exchange program in Japan. We hope to bring apprentices to Japan to document and study boatbuilding. I hope to keep documenting boats and boatbuilding techniques, and teaching these skills. The emergence of boatbuilding schools was the foundation of the revival of wooden boatbuilding in Europe, North America, and Oceania, and I think it is Japan's last hope to save this amazing craft.

The title of the main chapter, Stolen Lessons, refers to a well-known phrase in Japanese crafts, *nusumi geiko*. Sometimes masters kept secrets from their apprentices, who were then forced to steal them. It was the final test for the apprentice who, having persevered through the pressures of a six-year apprenticeship, and mastered its techniques, had to muster the cunning and guile to discover the deepest truths of the craft.

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Biography



Douglas Brooks is a boatbuilder, writer, and researcher. Since 1990 he has been studying traditional Japanese boatbuilding, focusing on the design techniques and secrets of the craft. He has apprenticed with nine boatbuilders from throughout Japan. He has authored four books and numerous articles on his research. His latest book, *Japanese Wooden Boatbuilding* (Floating World, 2015), is the first comprehensive survey of the craft. His work was honored by the American Craft Council in 2014 and he has taught Japanese boatbuilding across the United States and Japan. He lives with his wife Catherine in Vergennes, Vermont. To learn more, visit www.douglasbrooksboatbuilding.com.