CATALIN POGACI

THE QAJAQ BOOK

Conceiving and building a skin on frame qajaq

This book is dedicated to all my Maltese kayaking friends without whom I would have not discovered the sea the way I did.

It is also dedicated to the ones who didn’t lose the courage to build something by themselves.

1. INTRODUCTION

The original variant of this book was written in Romanian, as I wanted to make this kind of boat building known to my countrymen. There is very little info about it written in my maternal language and to be honest people are not very interested in boat building. But I have hopes and I don't feel sorry for writing it. Someday a kid (kid being just a generic term, no matter the age) will discover the book and will be very happy.

The current English version is slightly abbreviated, as I deleted some paragraphs of history which were not so important. It may also have grammar and expression mistakes. Despite having a good opinion of my own about mastering this language, it is not my mother tongue; therefore some mistakes are lurking for sure in the content of the book, ready to scratch the eyes of the linguistic purist. Please be indulgent, as this is only a self-published book about kayaks and not a Dickens' novel.

Another reason for which I decided to give it a go with the translation is there is surprisingly little dedicated literature about skin on frame boats. There are a few good books out there, published on Amazon and other platforms, but they address particular boats only, like Christopher Cunningham's book, or George Dyson's; some others address the fuselage style frames. There is of course Robert Morris' book, which is a landmark in skin boats technical literature, but it has no modern correspondent, not to mention an e-book variant. My impression is today, info is passed among amateur builders more under the form of internet content via Facebook and forums rather than books.

I may be wrong with this one, but I don't think there are any European books written on this subject either, which makes life a bit difficult for the builders of the Old World, where materials and their sources are different from the ones used in North America. Measurements are also different.

Apart from the above, this writing treats kayak building as a whole, teaching the reader how to build a kayak in itself, dimensioning it properly, and not how to build a specific replica from a specific era. It emphasizes the understanding of *the boat as a whole* and not only the west-greenland, east-greenland or the baidarka. It is also structured around

visual teaching methods, as it uses many pictures instead of drawings, being closer to the visual arts expressed in vlogs and Youtube DYI videos.

I wrote it from a slightly different point of view when it comes to the materials and methods used. The other works are oriented towards the North American continent, where the timber industry is a bit different. Mine has East-European influences, meaning it teaches people how to make a lot with little, or as it is said in English, a purse out of a sow's ear.

Just to end this lengthy introduction, the book reflects my own knowledge and building methods. Some things in it are as old as the world and described in other writings as well. Some others are not. Despite using the word "traditional" a lot, it doesn't mean something really is traditional. But this doesn't mean the method described with the help of this word will not work.

…this writing treats kayak building as a whole…

2.SHORT (HI)STORY OF THE KAYAK

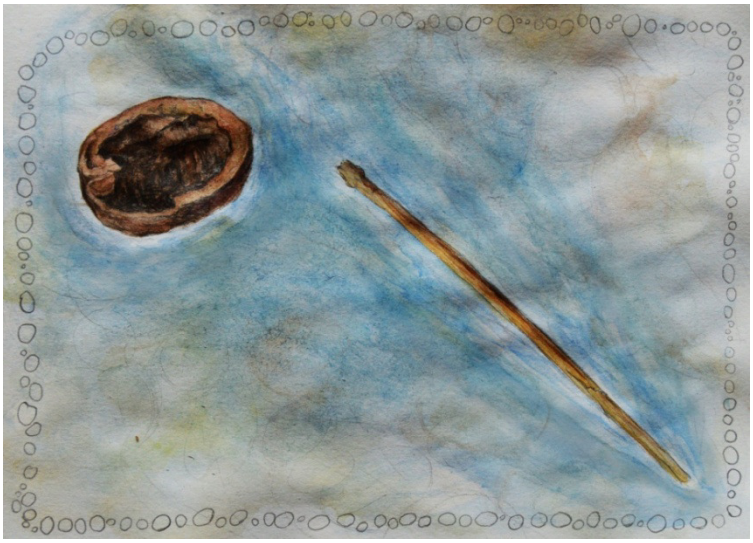
This part of the book is the abbreviated one. The Romanian variant is pretty cheesy I may say, as I allowed my imagination to fly a bit, having as a result a lengthy text. However this one still is based on the original, as I am too much in love with it to change it entirely. So, here it is.

Let us start by learning what a kayak is. Well, it is a boat. More than that, *it is a tool* or at least it used to be. It is a long narrow boat fully closed, meaning it has a deck covering its entire length with a small exemption: the cockpit. This is nothing but a hole in which the rider or the riders of the boat are sitting, having their legs and hips inside the bowels of the kayak and the upper part of the body outside, like the conning tower of a submarine. How did this boat end up with such looks and why?

It is a long narrow boat fully closed…

Some time ago, when people first started to deal with the water, their boats didn't look so fancy and racy. Most were only logs, or other floating objects which could help crossing a stretch of water. After some time, somebody came with the idea of putting a few logs together and make a raft. As such, there was more space and stability obtained, as only a single log rolls under one's feet, and people had a more viable solution to travel on water, especially when the raft can be somehow propelled. Here comes the paddle into being.

People also realized that something bulky and wide slides slower on the water than something long and narrow, as they had both examples prior. They also found out they could shape the timber into other forms, faster or slower, dig or burn spaces to sit in, but there was another problem to solve: the weight.



…something bulky and wide slides slower on the water than something long and narrow…

A single big log requires considerable strength to make it budge. I have no clue how many men are needed to push a big raft into the water. So, somebody wise decided to address the mater and build something different: a wooden frame shaped as a boat and dressed in animal hides. As such the weight diminished considerably and people were able to carry those boats from one place to another. As they became more and more skilled with the wood, they started to use it in more and more elaborate ways, building more and more elaborate boats, boats which had many uses, then ships, ships which had many uses and soon carried and spread the human kind all over the Earth.

But what do you do if you are unlucky enough to end up in a place where there aren't any trees, everything is frozen, the water is ice cold and your food consists of animals which can easily swim away? It may cross

…a wooden frame shaped as a boat…

your mind how useful a boat would be, as you can hunt from it, right? You may even have the knowledge to build one, but where to get the wood from? Well, combing the shores it is, and fetching whatever piece of timber the Ocean can spare. If not enough, you can also use animal bones to complete your frame. Make it long and narrow, as speed is needed to catch up with your prey or paddle for long distances. Make it nimble, as you'll need agility to fight on the water. Cover the frame entirely with animal hides, leaving only half of your body outside, to preserve body heat and keep yourself as dry as possible. Then what? Make a few steps back, look at your boat and call it a *qajaq*. This is how some people spell it. To be honest it sounds more exotic than kayak, despite being pronounced the same way. It has archaic and mysterious vibes in it, so this is how we are going to spell it from now. It literally means *the boat of the hunter,* or *the boat of the man* in the Inuit language.

This qajaq was the *tool* of the Artic People and not only theirs. It was a tool for hunting, carrying stuff and sometimes to have fun with. It was a tool born out of necessity and modeled by the sea. It evolved into different shapes and sizes, according to the needs of its builders,

geographical region, the waters it was used on and sometimes the builder's fantasy. It was considered to be a living being by some cultures.

All modern leisure qajaqs are descendants of the ancient ones. The most performant ones of our days are designed by a reputable naval architect then they get reviewed and written about in a fancy water sports magazine. The Inuits or the Amgam people had no architect apart from the sea itself, not to mention they had no clue about writing. They passed the info orally, by show and tell from father to son. They had large hearts and simple tools and made from their boats a work of art.

The time has come to learn a bit of their trade. If today's qajaq is mostly destined to be a recreational tool used to please people, I see no reason why building one would not serve the same purpose.

…look at your boat and call it a *qajaq*.

3.SETTING UP AND DREAMING

I cannot start this chapter without translating my motto like text, which also reigns supreme in the other book.

Motto: *These boats are a gift of the water. They were born like Aphrodite, from the foam of the waves, being created out of need, inventive human spirit and natural elements. They are as alive as we are and are the correspondent of our own self floating on the primordial substance which gave birth to us all – the water. They are a bridge connecting us with it. They talk to us through timber creaks and by dancing in the rhythm of the waves touching their canvas. Through them we are no longer spectators of the primordial system, but part of it. Once the first boat will be finished and the first experience of this kind absorbed, you may never want to feel the impersonal touch of a plastic made boat.*

Knowing all this now, let’s continue.

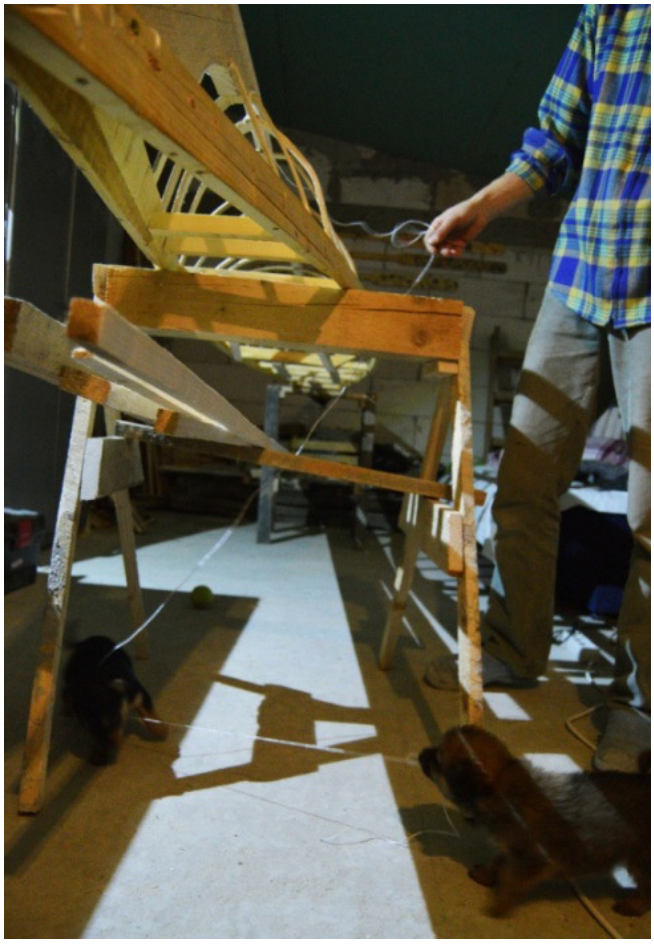
These boats are a gift of the water.

BEFORE STARTING

A few important details

This is the part where we get to the point and learn how to build. The writing becomes slightly more technical and pictures will come to our help. But before commencing, let us clarify a few things first:

- The skin-on-frame building method is pretty simple, versatile and flexible;
- The skin-on-frame boats are not produced in a row. Each one of them will come out differently, following the unique specifications and building methods of its creator; they are similar to the home made brandy;
- Therefore we describe below only the *process* which gives birth to such a boat and *not* a specific assembly scheme which contains technical drawings and measurements. If you'll understand this process and open a way to communicate with the wood and the tools, I see absolutely no reason to prevent you building any boat you want later on;
- The building process described below is the traditional one, using for thousands of years. We will not talk about fuselage style boats, or the so called Youst method;
- The building process is not described in an exact chronological order. This will be decided by the builder after reading the book and the whole process fully understood. Of course nothing will stop us to go back to the text along the way, to review certain paragraphs;
- The book reflects the author's view and personal experience on building such qajaqs. There still is room for improvising and improvement. If you feel you can do things in a different way, just go ahead and follow your own path. There is no greater satisfaction than a student exceeding his teacher's level.



This is the part where we get to the point…

Work mood

If you’re building something for the first time in your life, you have to know that a boat cannot be built in a jiffy. You’ll spend a lot of time just looking into the problem, thinking how to do things, using your imagination and learning how to use tools. It is highly recommended *not to speed things up and work in a rush*. Don’t work against the clock, just to fill up the norm. Don’t work when you have other things on your mind, as you’ll end up losing your focus and get frustrated. Sink yourselves totally into the work, even if it is for one hour only. *Work when you are in the mood to work and stop when you lost your mood*. Working such a boat should be *a spoil and not a torture. Even more, it is a meditative process.*

Time

Traditionally speaking, building a qajaq took more than one year. A lot of this time was spent finding and gathering the needed materials splitting the wood and creating the desired shapes and sizes. We don't need to waste so much time today, unless we really want to imitate the ancient ways. Today we have the benefit of finding the timber already cut as needed in warehouses and DYI stores. We also have another advantage: modern tools. Therefore:

- If you are a total beginner expect to have it done in a minimum of *one month* if you dedicate time every day. You will need it to find the space and prepare your workshop, gather materials, tools and a lot of *think*ing. At the start, things are going to move slower and maybe a bit frustrating, but later on, after finishing your "warmup" you'll do better. If you have very little time available and a relaxed style of working, let us say the project will extend for the whole winter. Anyway, the water is cold during this period.
- If you already are a hobby builder, familiar with wood working and already have the tools and a shop, you'll spend most of the time studying the build and not learning how to work. Without rushing you'll need *2 or 3 weeks* to finalize the project;
- If you are a dedicated boat builder having loads of experience with wooden boats, you should finish in a week or so;
- Do not forget the wife factor here; it may add considerable time.

Costs

Subject to the materials to be used and the working method, you can expect more or less the following:

- For free, or almost there if you have timber left from a previous carpentry job; if you like using only hand tools which operate without electricity; if you have a source of wooden left-overs or shipping pallets; if you are a resourceful person who knows how to source out materials from nature or garbage;
- Under 100 Euro if cheap materials will be used and you build a small simple boat;

- Between 100 and 250 Euro if you use a tad more expensive timber , like the pieces already cut at standard dimensions, specific to the industry and buy from DYI shops;
- Between 250 and 500 Euro if expensive materials are going to be used (in here we have to count also the skin, as most of the times it may be more expensive than the wood), we are more exigent and well anchored into the consumer's world; in other words we like more to buy stuff than to recycle and improvise.

We can easily see that such a project is not very expensive. In most instances the costs will rival or even best the costs of a cheap inflatable kayak (deliberately using the k spelling as inflatables are not really qajaqs) bought in Dechatlon. There would be no use to compare the two.

For free, or almost there if you have timber left from a previous carpentry job;

Failures

Every project will have its failures, especially when building something for the first time. However failing at something does not automatically mean we have to get discouraged, when things don't come out as they should at the first attempt. There will be pieces which will crack or break and joints which will stubbornly refuse to come together. Don't put it to your heart! Don't drop everything and run away. All failures are part of a natural process of adaptation. *The hardships are only in your mind and the real battle will be fought in there* and not with the wood or the tools. At the end, when everything will be finished, you'll be quite satisfied for overcoming the difficulties. You'll pride yourself for the capability of finishing such a project.

There will be pieces which will crack or break…

NECESSITIES

Workspace

Strictly speaking these boats were built outside, without much fuss. People used to find an adequate place around their house (hut, shed or igloo), brought in their tools and materials and started to work. You can do the same today, given the simplicity of the build. In fact, it doesn't matter where you decide to build your qajaq as long as you follow the below basic and common sense rules:

- *To have sufficient space* to accommodate the boat, the tools and all the materials; it would be annoying and frustrating to realize later you have no space for the boat or you have no space to work around it. It would be good to have also everything around you as it may become tiring to carry stuff from one place to another;
- *To have easy access* and a method to remove the boat from your shop. In other words be careful not to have to demolish a wall in order to extract the boat from the shop. Take your time to measure the space properly;
- *To have decent lighting*. You have no idea how frustrating it is not to see what you are doing. It can be natural or artificial light, it doesn't matter as long as it does the job;
- *To be able to make some noise* without disturbing anyone (family included). Normally the noise level is well under the decibels number of an apartment being refurbished, especially if only hand tools are used: some hammer cloncks, saw noise and your own exclamations here and there;
- To have a power source: a well placed plug, a power cord extension, anything which can power an electrical tool. I didn't put this in Italic letters as it is not mandatory if you chose to use hand tools only;
- *To be dry*. Dry can mean also outside if it is not raining.

The remaining conditions are according to how cushy you want to feel and your imagination. Ideally would be to also have the place heated but it is not mandatory. You can work under the clear blue sky and take a break when the sky is no longer blue and it is raining. You can improvise a small shelter out of a tarp. You can work only during the warm season if your

shop is not heated (for example like when working inside a warehouse). As long as you follow the above rules you can work in your own backyard, storage room, barn, apartment, dedicated workshop (if you have one) or even on a public space around your neighborhood, as long as you don’t break any rules and there are no objections (you may even make new friends).

***To have easy access* and a method to remove the boat from your shop.**

The only problem in such a case would be carrying the tools and materials there, but even this is easy to solve with careful planning.

If still, you cannot cope and it is impossible to find the right place, address the problem to a friend which may own one. Who knows, he may be interested himself in such a project and it is more fun when you don’t work alone.

…you can work in your own backyard, storage room, barn, apartment, dedicated workshop…

Transportation and storage

If you decided to start and already solved all the above, the next problem would be how to carry the boat and where to store it.

Transportation is not a very complex problem. If you own a vehicle, it is enough to equip it with a decent roof rack. If you don't care much about the car, it works even without having one, as the boats are light enough to be easily supported by the car's bare roof. A pair of pool noodles should be enough to carry the qajaq on, as long as it is properly tethered to the car. The same vehicle will be needed to carry the needed tools and materials to your shop, in case you don't work next to a DYI facility where you can walk to.

You can store your qajaq in any place where it can nicely dry completely. According to your boat's dimensions, it can be stored in a barn, shop, house and apartment. In fact you can choose the dimensions of

the boat according to the available building and storage space. For example if storage and access space are a problem you can choose to build a smaller qajaq that can fit.

…it is enough to equip it with a decent roof rack.

A pair of pool noodles should be enough…

Tools

The simplicity of the work doesn't require complex or expensive tools. The simplest and unreplaceable ones are your own hands. Yes, please be introduced to your own hands as this is what you'll use during most of the time. They will learn to shape the wood according to the will which guides them, they will learn to hold tools, but still the real tools are going to be themselves. If we desire to build our qajaq the same way as the Inuit people did, an axe and a knife would suffice, given the fact we can make the other tools with them, but let us stick to the things which can make our work more comfortable.

A word of warning here but: *this book is not a carpentry manual of a crafts school*. We rely on the fact everybody has a vague idea on how to use a hammer and a handsaw. When mentioning electrical tools later, we rely on the fact their owner knows how to use them safely or at least has the will to read the user's manual. *The safety measures are all yours!*

We divided the tools into a few categories, according to the processing degree of our available timber: the more complex the degree of processing, the simpler the tools we'll need, as we'll basically have our parts already cut in shapes.

Basic and strictly necessary tools – same as with a website's cookies, we cannot start or finalize our project without them. These tools should suffice if we decided to acquire the wood already cut in standard shapes and sizes which fit our project, leaving us only the process of adjusting and assembling them. They may fit a total beginner best and comprise of the following items which can be bought or borrowed:

- Measure tape;
- A universal wood saw; a medium sized one should be enough. It doesn't really matter the type as long as it cuts well (my favorite is a Japanese style one purchased from *Lidl* many years ago);
- A rubber or wooden hammer for inserting dowels. Why a wooden one? Because it leaves no hitting marks on the wood. It is as stealthy as an Agatha Christie villain;
- A hand or battery powered driller, which can also be used as a screwdriver;
- Three drill bits for wood dimensioned in 3, 6 and 8mm;
- A 6mm wide flat wood chisel;
- A cross slot hand screw driver or the matching bit for the driller;
- A rasp;
- A round sectioned file for wood;
- 80 and 120 grit sandpaper;
- A piece of wood to dress it with the sandpaper for a better grip. You can easily use a piece cut from a plank;
- A piece of polyethylene rope, 25m long and 5-6mm thick which will be used for all kind of temporary joints or to forcefully join together two elastic pieces of wood;
- A knife, a box opener, any other sharp instrument which cuts well;
- Well sharpened scissors;
- A middle size stitching needle;
- A piece of steel wire, 2mm thick which will be used to insert thread through holes;
- A box of 3.5x3mm of chipboard screws or a box of nails roughly the same size which will be used for temporary joints instead of clamps, which are more expensive. Screws are the ideal ones as they are easy to remove;
- A bag of nylon zippers (cable ties) at least 20cm long, also for temporary joints;

- A nylon bag to accommodate all the stuff above. A supermarket bag would be ideal.

Basic and strictly necessary tools

Optional tools – the below tools are for making our work easier but sometimes they will also make our wallet lighter. We can add them to the basic ones.

- Two sawhorses we can place our qajaq on at a reasonable height to avoid bending over all the time. We can build a pair ourselves, buy them or use a pair of sufficiently solid chairs instead;
- A work bench on top of which we can work without having to torture our knees on the floor. It can be adapted out of a solid table, firmly anchored on its legs without moving too much;
- A work bench vise (or even two);
- All kind of clamps; the more the better. Would be nice to have a whole variation of them;
- Nylon straps (like the ones used to secure objects on the car with or without a ratchet);
- A tool box to store most of the above stuff.

Professional tools – these are for the ones who can cope with raw timber and cut it into whatever shape and dimension they want.

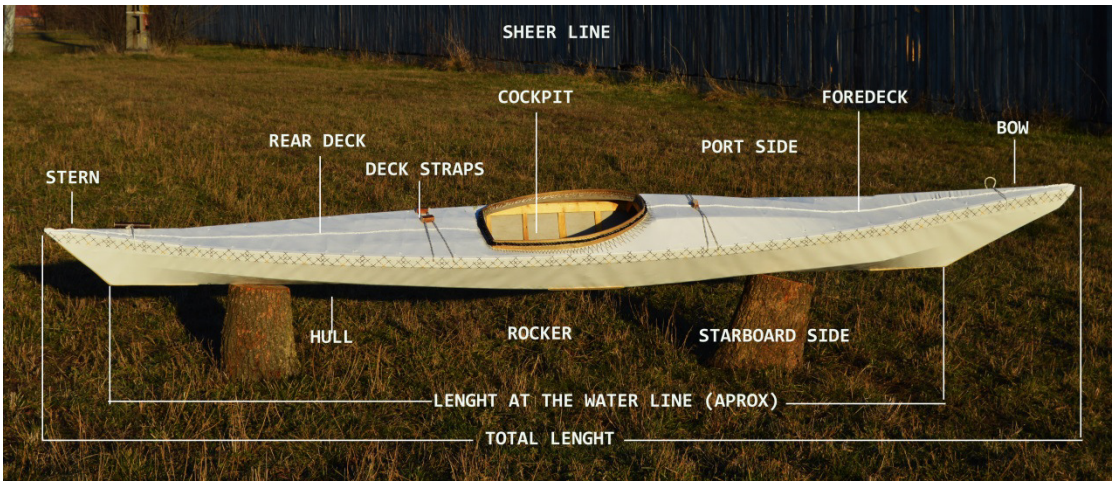
- A table saw, or a hand circular saw. A table saw would be the best;
- A jigsaw with various blades;
- An axe;
- A hand or electrical plainer;
- An entire milling machine (for the ones who can afford one);
- Measuring instruments.

We know our tools now. Make your choice and decide what would suit you best. In general it will be a mixture of the above. You can do whatever you can with the tools you have and then ask for help from a professional if you are lacking some.

At this moment any other author would continue with a chapter involving the needed materials and how to source them out. My opinion is it would be useless to look into the timber if we don’t know first what we need it for. Therefore we’ll mention next the components forming a traditionally build qajaq.

KNOWING YOUR BOAT

We cannot start working until we don't find out what we will build. Therefore the best would be to know the process which gives birth to the boat, the algorithm leading to the qajaq we want. Let us get acquainted to the elements which form a qajaq as subject to them we will decide what to do further.



Let us know first the elements which form the qajaq…

Fortunately the qajaq has a limited number of structural elements which are shared by most of the boats. We are going to name them one at a time, not to create a nautical terms dictionary, but to ease our later work. It is less difficult to refer to a certain part by its name instead of calling it "this or that piece of wood" and mixing them up.

The hull - like any other vessel the qajaq has a hull. It is basically the body of the boat, which in our case has its outer layer made of natural or synthetic fiber material which is stretched on its wooden frame. We have to

linger over the hull a bit and unveil other important things as it will be useful to know them later.

There are two kinds of hulls or even more, but let us stick to these two. One of them is called a *displacement hull* and it means the body of the boat goes through the water when it is moving. Most qajaqs have this kind of a hull and are subject to the laws governing it. To put it plainly, a qajaq will have a significant part of its body submerged and this is how it will move and float around. As such, it will be influenced by the movements of the water (aka the waves) and the *length and the shape of its submerged hull will dictate the performance and the behavior of the boat on the water* (there are some others things in here too, but let us not clog our mind with them).

The other one is called a *planing hull*, which means the boat will raise and glide on top of the water when enough speed is achieved. Such a hull may act as a displacement hull when the boat is moves slowly or stands still. In this category we have a good example in the fast power boats.

Some high performance qajaqs are designed with semiplaning hulls, which mean they can partially lift their body on top of the water at high speeds, overcoming the limitations and the friction given by a classical displacement hull. We can build such qajaqs using the skin on frame technology, but designing them is outside the traditional ways and not mentioned in this book. With enough study and mastering the building techniques you can build one yourself.

The hull can be split into several other elements, which are described further below.

The bow – it is the most forward part of the boat, its nose. However, now that we know the word, don't call it a nose anymore.

The stern – it is the rearmost part of the qajaq, its tail. Now you know, don't call it a tail any longer.

The starboard - it is the right side of the boat relative to its marching direction.

The port – it is the left side of the boat relative to its marching direction.

The rocker – this is the amount of curvature the bottom of the qajaq will have along its length. It can have a lot or none of it.

The sheer line – this is the amount of curvature the top of the boat will have along its length.

The cockpit – it is the place where the rider sits, having half of his/hers body protected from the elements. We are going to hover above this subject a bit as there is more to tell.

The cockpit can be of several kinds. It may be open, non-existent in fact, meaning the man seats on top of the qajaq, totally exposed, but it would be pointless to call it a cockpit in this case. Such a boat is simply called a seat on top and we will not talk about them as they are off topic here.

It can be a sit-in cockpit, which means the man has half of the body inside the boat, as described before. This cockpit has two major variations, according to the entry hole defining it and the inside space: it can be an **ocean cockpit** or a **keyhole cockpit.**

The ocean cockpit – is the traditional one, inherited from the Inuits. It is a tight fit (they say a well- built qajaq is worn like a coat) and has a ridiculously small entry meant to minimize water ingress into the boat. Entering and exiting such a cockpit is a bit of a balancing act, as we have to sneak in feet first while being seated on the rear deck and having the qajaq kept upright by its paddle. You will seat with your legs stretched forward, which can be tiring for long rides, especially for the less flexible people. However, once mastered, this kind of a cockpit will give you an astonishing control over the qajaq.

The ocean cockpit

The keyhole cockpit – is a modern derivative of the ocean one. It is not such a snug fit as the ocean one, leaving some room to move your legs. The seating position is more comfortable, having your legs slightly bent and slightly spread (like the two brackets flanking this explanation). It will not put you in a firm contact with the boat, this needing to be done through means of tight braces and foot pegs or a footboard instead of the pegs. Its main feature is the shape of the entry, which is larger, way larger than the ocean one, and resembles a classical keyhole (that's where the name from). Entering and exiting is obviously easier, as we can simply lower ourselves sited into it then insert our legs under the forward rim. The keyhole cockpit is the most used today, basically any commercially built qajaq coming with one.

If you don't feel flexible or young enough for an ocean cockpit, the keyhole is the way to go.

The keyhole cockpit

The deck – it is the upper part of the boat. It can be split into the **forward deck,** which is the area ahead of the cockpit and the **rear deck,** which is the area behind the cockpit and a term we already mentioned.

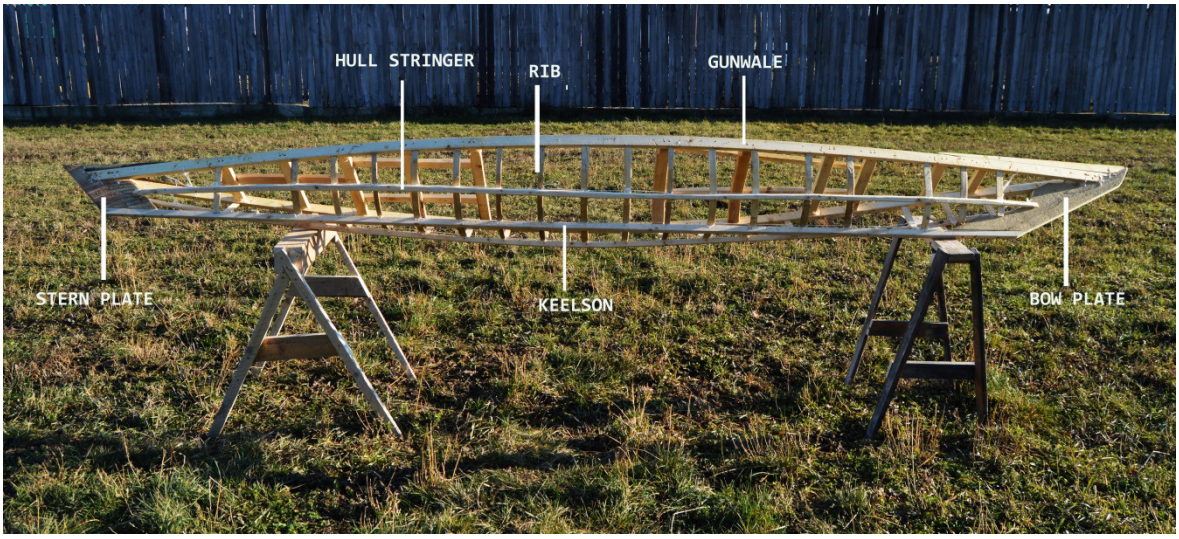
The deck straps – those are the cleverly laid bungees and straps which you see on the deck of the boat and under which we can store items needed on the water. They have other roles too, the most important one being related to the safety of the trip. In case of capsizing it would be easier to hold on to our qajaq by grabbing them instead of trying to latch ourselves onto

a shiny slippery hull. They can also support one end of our paddle which we can use as an outrigger to stabilize the boat.

Dimensions – the qajaq has a few lines which we should measure in order to have an idea about how to use them later. One of them is the *total length*, which means literally the length of the boat from head to toes. There is also the *length at the water line*, meaning the length of the submerged part of the hull. We have also the *width* of the qajaq, also called the *beam* in nautical terms and the *depth* of the boat, meaning the distance measured between the most upper point of the deck down to the lowest point of the keelson. All these combined will give you the internal *volume*, an important value for internal storage and buoyancy.

Now, that we enlightened ourselves about the major components and measures of the qajaq, let us look at the below pictures in order to go to the next step of knowing the boat: the inner structural parts. For the curious ones, I also added their Inuit language meanings.

THE INNER STRUCTURAL PARTS



The structural parts. Lateral view.

The gunwales (apummaq) - there are two of them and they form the upper edge of the boat, the frame of the deck. They basically are the spinal column of a qajaq. If bigger boats are built from the bottom to the top, a qajaq's order of building is reversed, being built from the top to the bottom and starting with the gunwales. For giving you a bigger picture, imagine almost all major structural components are attached to the gunwales, hence their importance and the reason why they have such an ample chapter dedicated to them further below.

The deck beams (ajaat) – they connect the two gunwales like the steps of a ladder, forming the frame of the deck and helping to shape the boat. They need to be sufficiently solid to be sited on.

The deck stringers (tunersuq) – they connect two of more deck beams in order to fill up the gap between them and help stretching the skin. In general there are going to be two or three on the rear deck and one or two on the front deck. The rear ones will support your bottom when mounting the qajaq and will prevent you to fall through the skin between the deck beams.

The ribs (tulimaq) – are the steam bent elements which connect the gunwales to the keelson and help shaping the hull. It is not really necessary to have rounded ribs. They can also be in the shape of a shallow V, if you don't want to steam bend any wood. Some projects replaced them completely with transversal frames (bulkheads), but we are not going to talk about those.

The hull stringers (siaaneq) – they are the longitudinal structural elements which connect the ribs the stem and the transom. Apart from carrying some of the structural loads of the boat, they are also keeping the skin away from the ribs, giving it a smooth shape, avoiding the accordion like wrinkles the skin would get if resting directly on the ribs. The siaaneq will also generate the amount of roundness the hull will have: the more stringers we'll have, the rounder the hull. A typical qajaq will have between 2 to 4 hull stringers.

The keelson (kujaaq) – it is the equivalent of the keel in the bigger boats, which is the spinal column of their frame. Most ships will be built starting with the keel (laying the keel). With qajaqs, things are a bit different. We explained above that the main structural parts are the gunwales, therefore the keelson takes the role of the keel only by the position it occupies in the frame and nothing more. Strictly speaking it is more or less of a stringer, but slightly enlarged and stronger in some boats.

The stem (niutaaq) – it is the structural part which closes the frame at the bow. Its shape will determine the shape of the bow in general and the way the boat will cope with the waves coming from the front quarter.

The transom (also niutaaq) – it is the structural part which closes the frame at the stern. It is a bit inappropriate to name it a transom in a qajaq, as this part comes perpendicular to the gunwales in a normal boat and not as their extension, like in a qajaq. Most builders, the Inuits included, call it a stem and the two taken together (stem and transom) are the **stem plates.** You can call it however you want as long as you don't mix the bow plate with the stern one.

The cockpit rim (paaq) – this part has two roles, even three when thinking better. The first one is its contribution to stretch the skin in the central part of the qajaq, as we are going to tension the skin around the rim. The second role is not to leave an ugly hole inside the skin through which we will sneak our body inside the boat. The third role, a very important one, is to support the neoprene spray skirt which seals the cockpit shut, to prevent the water from entering the boat. The cockpit rim needs to be sufficiently solid to withstand our own weight (in case we would accidentally mount it) and also to be capable of withstanding the weight of the qajaq, as sometimes we will hold the boat by it. It also needs to be dimensioned as such as its rear to rest on the masiq and the rear on the isserfiq (read below the masiq' and isserfiq' description). It cannot stay in midair, supported only by the skin.

The skin – this was traditionally made of animal hides. Nowadays we use natural or synthetic fiber. It's easy to understand its role: first of all

to keep the water out and shape the boat; second, to strengthen the frame by holding all the elements tight together. A correctly stretched skin should be like the skin on a drum (and sound roughly the same).

Frame elements peculiar to qajaqs

Apart from the ones already mentioned above, qajaqs have some peculiar structural elements with distinctive roles and names.

The masiq (we can spell it also with a *k* instead of the *q*) – it is basically a deck beam, but it is curved upwards, so we can fit our legs under it and is mounted in the front part of the cockpit, having the front part of the rim resting on it. The masiq is quite an important piece. It needs to be very strong, as we will lift the qajaq by holding onto it quite often. Having the front part of the cockpit rim resting on it also requires a considerable amount of strength, for the situations in which we will seat on the rim, instead of seating inside the cockpit and having our weight pressing on the masiq. It will put us in direct contact with the boat in the case of on ocean cockpit, as our knees will be touching it and in case of an eskimo-roll, the masiq will be part of our fulcrum to roll the boat.

This special deck beam has sometimes a smaller brother called a *seeqqortafiq* which can be placed directly in front of it. This was used in order to avoid a direct contact between the front deck stringers and the

The masiq

masiq and to have a more pronounced curvature of the front deck, resulting in more leg room. The *seeqqortafiq* can be totally eliminated if such features are not desired.

The gunwales raisers – these are parts which are placed at the ends of the gunwales in order to create or be a part of the convex curvature of the boat (its mild banana shape) and add more volume to the ends. Using the boat builder's language, it is called a *sheer line* and we mentioned it before. There are other solutions to obtain this shape, such as planing the gunwales towards their middle and leave the ends wider. They can be totally deleted in boats with peculiar shapes, with no sheer.

Things in common with other boats – the frame of a qajaq has a lot in common with the frame of other boats. Once you learned how to build a qajaq and the role of each part forming it you will realize it is quite easy (even easier) to build a canoe which is nothing more but a qajaq without a deck, or a row boat, which is a canoe with a real transom.

The gunwales' raisers

…a canoe which is nothing more but a qajaq without a deck…

…a row boat, which is a canoe with a real transom.

ANTROPOMETHRIC MEASURES

Qajaqs have been around for more than 4000 years. It is easy to deduct they weren't always built using today's tools. It is also easy to understand it is not difficult to build one, if others did it thousands of years ago using almost no tools. There are a few simple things available to any builder and peculiar to every builder.

One of them is the fact you don't need measuring tools to scale your boat. Every builder owns them already incorporated into his physique. For the sake of measuring and to avoid confusing the ones who build for their first time, we will continue using the metric system, but we will mention though a basic traditional measuring set.

As already said, every builder has his own measuring tools since birth. These are the hands, the legs, his / hers feet, palms and fingers, arms and hips. They are the best measurements for a qajaq conceived around our own body. They are the same measures used by a tailor to make the best fitting costume for you.

Therefore, because it is going to be very useful later, grab a ruler or a measure tape and measure the following:

- An arm span – hold your arms stretched laterally with your palms open and measure the resulting distance;
- One forearm length – measure how long is you forearm from the fingers to the elbow;
- A closed fist – measure how long is your closed fist;
- A fist with an extended thumb, or the "like symbol for Facebook" – measure this length too;
- One palm – measure your open palm's width;
- A foot length – no, it not the imperial foot, only yours; measure its length from heel to toe;
- The distance between your stretched index and your thumb; the L sign;
- A finger – neah, it is not what you think, only the width of your index or even middle finger.

You may wonder why you have to take these measures since we decided we don't even need measuring tools after all. Well, you can use the above ones, by simply sticking them to the wooden parts then mark the required lengths, you can create templates of the above lengths by using a string or

a stick, or you can simply jot down their metric values and use a normal measure tape.

An arm span

A forearm length

A closed fist

One palm

A foot’s length

The L sign

The “Like” symbol

A finger

BUILDING PECULARITIES

There are a few more things we need to know before starting. One of them is such a boat needs no modern joining methods, like using nails, screws or glue. You can use them if you really wish to, but you'll obtain a more rigid boat which will be more prone to damage. Elasticity is the strength of such a boat and not rigidity. Apart from this, screws and nails will rust in contact with the water (even stainless steel ones). The easiest way is to abide to the traditional methods and use wooden pegs and lashings for all the joints. You'll obtain an elastic frame, similar to a straw hat, which by all means will be stronger than a wooden box with its porcelain like features.

Another one is the fact you don't need too much clockwork during the build. The man is not a machine and the work of his hands imperfect as it is, makes a good example of perfection. We don't have to be scared if something doesn't come out with machinery precision. Such a boat doesn't require such precision. The allowed tolerances are pretty high. We don't have to rip our hair off if our stitching is not a perfectly straight line. If it does the job, everything is fine. We don't have to despair if some finishing is not nice and shiny. A finish is just a finish and some centuries ago people didn't even know what sandpaper is. They used a knife or a rock at best.

Indeed there are professional builders with good tools who can create perfect boats; so perfect, they look factory made. But it is like comparing a woman which just came out of the plastic surgeon's clinic with a normal one: both are beautiful, but only one is natural.

…wooden pegs and lashings…