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Cavallino, a Pershing 80'

Building Your Boat in Asia

Searching for the Dragon's Ribs

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BUILDING YOUR BOAT IN ASIA

Basics and FAQs for Future Boat Owners

By Albert Nazarov

Albert Nazarov is a naval architect and Managing Director of Thailand-based Albatross Marine Design. With dozens of boats built to his designs in Thailand, China, Malaysia, the Philippines, Vietnam, and Turkey. In this article, he summarizes his experience of handling boatbuilding projects in the region.

Like every high cost and long production cycle industry, boat building is often associated with certain risks. On one hand, cheaper labor prices and cheaper materials in Asia can provide considerable savings. On the other hand, a foreigner ordering a boat in Asia may not have proper legal protection and may endure delays, low quality builds and scams. The shipyards that allow such situations damage the entire industry of boatbuilding in Asia and affect the builders who really deliver boats in good quality and on time. With this in mind, the right choice of project and builder becomes extremely important. Needless to say the following advice represents the personal opinion of the author and are based on his and his colleagues' experience.

TECHNICAL ISSUES

There are five main design factors in making a good boat: aesthetics, performance, safety, comfort and cost. These factors can be contradictory, but a good compromise between them makes for a good boat. If all of these are satisfied, the boat will serve her owner long and well and have a good resale value. A nice looking boat without performance has very little value... Well, maybe this statement excludes houseboats.

Myth of the "Proven Hull"

Sometimes builders will say that they have "proven hull designs" or "a mould of proven hull". These statements are often used to give the impression that this hull has already been built and proven to work well under all conditions. But in practice a "proven hull" for certain purposes does not automatically mean that the hull will work well under different circumstances. For instance, a good working hull of a light pleasure boat will not work for a ferry with a much higher payload – the boat will have excess trim, will not reach desired speeds and will also have more draft. A "proven hull" of a sailing catamaran will not make a good powercat running at 30kts.

When looking at a 'proven hull', try to

compare the original design purpose of that hull and the intended use of your boat. If the displacement, payload, speed or weight distribution of your boat should be significantly different (say, more than 10-20%) avoid using that "proven hull" regardless of what the builder is promising. A hull shape designed especially for your purpose and overseen by a specialist will always be better than something modified, and also better in terms of resale value and fuel economy.

Modifying the Moulds

The use of existing moulds allows for lower cost FRP boat construction. In practice, some builders copy moulds from existing hulls and then do modifications of molds by cutting them, adding a wedge at the centerline, extending the stern, etc. This will normally cause the boat to sit with excess trim, non-optimum hydrodynamics of the hull, poor aesthetics, etc. I suggest avoiding modified moulds unless the builder knows exactly what he or she is doing and the mould is modified with the advice of a naval architect, or better yet the original designer of the boat. To say more, any modifications of moulds without calculations of hydrostatics, weight distribution and performance is a gamble for your money. I have seen very few successful mould modifications in my practice. Also one should note that a hull copyright law was recently introduced, aimed at preventing builders from copying hulls.

In cooperation with some builders in Thailand, Albatross Marine Design has developed a system of using temporary molds made in plywood for custom boat construction. This allows for a reduction in mould construction costs that is significant for one-off projects.

How Fast Will the Boat Be?

Answering this question requires analysis of the technical data of the boat and its propulsion system to give a precise answer. A boat that weights 10 tons will not run 50kts with twin 400HP engines. Even with a "new hull design", "parented propeller" or other fictional advantages. Why? Because, despite some irresponsible "builders" and "designers" who promise unachievable results as part of marketing, there are still the laws of physics. Normally it is necessary to involve a qualified naval architect to get power-speed calculations. The customer should always require that such predictions be performed by a professional and should not trust it to amateurs or "software users" – they often have no clue about reliable methods and their results. Another common reason for a boat not delivering promised speeds is poor weight management during construction...

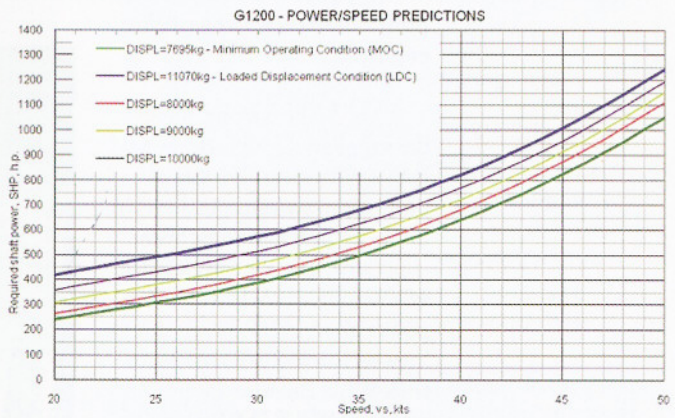

Fig.2 – Sample of speed-power predictions for 12m planning powerboat. *This prediction is done by the Savitsky method, for range of displacements. Usually 2-3 different suitable methods are used for each design to get reliable predictions.*

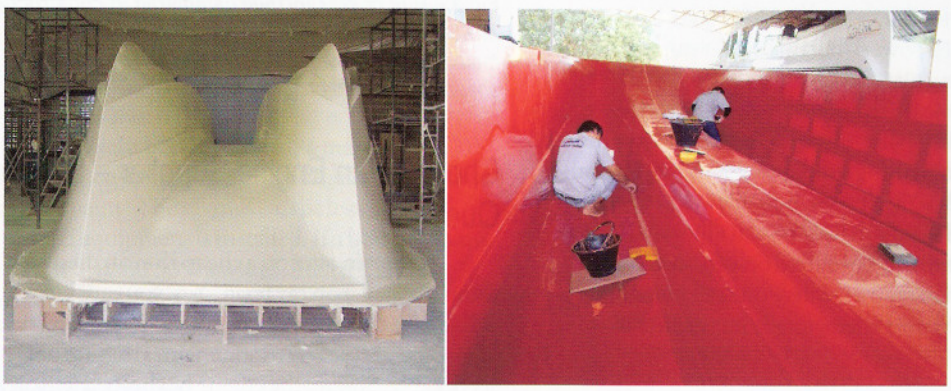

Fig.1 – Plug and mold for a new model of 8m catamaran at AusThai Marine. *Their smart range of catamaran hulls of 6, 8 and 10m are designed to cover several applications – from water taxis and diving boats to sportfishers. It is also suitable for some customization. Most models are CE-marked and delivered to more than 10 countries.*

So, How Much Horsepower do I Need?

There are a few facts to remember:

- Minimal horsepower for small crafts is 1-2HP per 1 ton of displacement – just to move the boat at 3-5 kts without wind or current.
- The recommended power for sailing boats is 4-6HP power per 1 ton of displacement

- The recommended power for motorsailers, catamarans and powerboats with high windage is 6-10HP per ton
- To start planing, the boat with a properly designed hull needs a minimum of about 30-40HP per 1 ton of displacement
- To reach 50kts, a boat with a proper hull shape requires about 140-230HP per ton depending on boat size, hull shape and weight distribu tion.

Electrical Propulsion – the Truth

There is a lot of talk about electrical propulsion and some boat owners are caught by the chimeras of electrical motors on their boat. But we should distinguish between truth and advertised fiction.

Myth 1. Electrical motors deliver more power than diesel or gasoline engines.

Needless to say, most of the suppliers' comparisons between diesel and electrical propulsion systems put diesel in unfavorable conditions. Some suppliers claim that an electrical 10kW motor can deliver 'more power' than 25HP diesels due to 'new technologies'. This is not true. Why? Because the engine rated 25HP (18.7kW) at crankshaft is always more than 10kw (13.3HP) even considering losses for gearbox and shaft bearings (3-7%). Electrical motors can deliver peak power for a few seconds (this power is about 200% of rated power), but this power can hardly be utilized in practice.

The next argument aimed at the novice customer will be that "electrical motors deliver more torque" or something similar. Actually this is another "partial truth". Yes, it does, but only at idle speeds! How often do you run your boat at idle speed? This advantage can only be utilized on very slow boats with very small motors, where one can install a very big, low-RPM propeller... totally impractical in reality.

Myth 2. Electrical propulsion is more fuel efficient than internal combustion engines

For most boats this is not true for generator/electrical motor systems. It may possibly be true for a rechargeable system, but that possesses a very limited range under power if no powerful backup generator is used. Add complications, costs and risks of failure into your considerations...

For those really interested in electrical propulsion, I can recommend a detailed paper by Nigel Calder in *Professional Boatbuilder* #109-2007. In summary: electrical propulsion is only justified in some special cases and limited to slow speed boats with big housing loads – houseboats, some big sailboats, etc. In this case systems with a generator plus electrical motors will work due to a better flexibility of power management.

It can be said that electrical propulsion is good for smooth operation on lakes and rivers and for quiet tours, but most of these systems can hardly be used on offshore boats. Should one decide to go ahead with electrical propulsion, he or she should clearly understand the modes of operation and limitations. Do not rely only on advertisement publications. There are new systems coming on the market every year – try to buy a complete system from a reputable supplier or just forget about it. But for me, nothing is more reliable than marine diesel!

Fig.3 – Hull of Wasabi1500 catamaran in construction at RB Sailing Center. *This yard is using temporary moulds built in plywood to produce such complicated shapes for custom projects.*

Choosing an Engine Supplier – Service Question

"I got an offer on a cheap Korean diesel, and I want to install it on my boat!" Yes, you can, but who will service the engine in Thailand? I always wonder why some people buy exotic engines that are not serviceable. Should the engine be shipped to Korea for a warranty claim? My advice is: choose an engine serviceable in your area. Some marine engines readily serviceable in Thailand are: Volvo, Yanmar, Caterpillar and Mercruiser for inboards and Suzuki, Yamaha, Honda, Mercury, and Evinrude for outboards. Service means real shops with mechanics and stocks of spare parts and equipment. The higher price you pay for these brands is offset by real savings in services.

DEALING WITH BUILDER

Quality Expectations

Some builders in Asia produce fine quality boats, some produce boats that look reasonable and some are simply unacceptable. But one thing is evident: one cannot expect a top quality finish from a budget boatbuilder. This does not necessarily mean the boat is badly built, it just matches its price. Definitely for the potential buyer there is a wide spectrum of prices and quality levels, unfortunately some customers with exaggerated quality expectations tend to choose the cheapest builders... the result is predictable.

Fig.4 – Hull of 90-foot motoryacht laid in mold at SEAT Boat. *This is the oldest and most established FRP boatbuilder in Thailand, delivering boats for private customers, companies and the government.*

Savings in Asia

How much should one expect to save in Asia? We might be right if we say a maximum of 20-30% of the cost of a similar boat built in Europe with similar quality. The savings can be less if a lot of imported equipment is installed. If a builder claims anything around 50% savings, then it should be clear that the level of quality and equipment installed will be inferior.

Builder's Ethics

I always find it unfair (as well as unethical and possibly illegal) when builders use photos of boats they didn't build on their website. Some of these builders just propose stock designs and arrange photos of sisterships (built by other yards) for illustration (often without mentioning the source of the photos). Others have never built anything of the desired size and just use these photos to attract customers. In any case, both mislead customers on their real launching record and capabilities. I know a few builders in Thailand (and not only in Thailand!) who practice this "way of marketing". So my advice is: check if boats presented on the web are really built by this builder, and if not – just run away from this yard, as this is a clear sign of a potential scam.

Choosing the Builder

Before contracting the builder, try to answer these questions:

- Are you making the contract with a real builder with adequate facilities or just with middlemen? Who is the general contractor, and who are you are transferring money to?
- What part of the project will be performed by the general contractor, and what will be outsourced to subcontractors? Having too many subcontractors increases the risk, especially in Asia. At least the hull construction should be done by the general contractor.
- What are the general contractor's assets? Do they own the yard (land, buildings) or just rent it? Transferring money to a company without assets is a big risk.
- How many boats do they launch per year? This is a measure of a yard's efficiency. If they have never launched any boat of a similar size/type – just forget about them.
- Does the yard have enough experience in the construction of a boat of the desired size? It would be very risky to order a 70-footer from a company that only builds 20-foot dinghies – they are unlikely to have their own specialists and subcontractors, or production system for such a complicated boat. It is likely that they won't even be able to give a precise quote...
- How long has the yard been in business? How long do the leading specialists stay? How often do they change staff? These are factors of stability regarding staff and management.
- Can you visit other boats built by this builder and get references from their owners? What do they say about after-sales service? One should be careful about listening to the customers whose boats are still in yard – your money might just go towards helping the builder to complete their boats.
- Though certification is not mandatory in Thailand, have other boats from this builder been certified for other markets such as for Europe or the US?
- On what boat shows can we see boats from this builder?

Such checks of the builder's background and reputation help to avoid problems in the future.

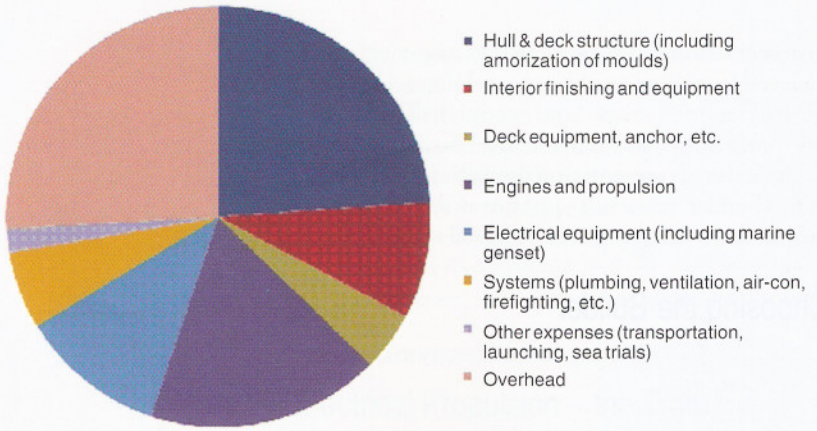

Fig.5 - Typical distribution of costs for 10m power catamaran with outboard engines.

Tour the Yard

Yes, you have to visit the yard before making the decision to go ahead with this builder. First, check if the person showing you the yard is really the owner or staff of this yard (the author knows examples of the opposite!). Then, look at the yard itself. Does it look neat and clean inside? Does it look busy? How many workers do they have? (check the number of motorbikes in the front of yard). Do some hulls at the yard seem like abandoned projects? If all boats (i.e. hulls) are in the "sanding stage", then definitely something is wrong – for real working yards, there should be boats at different stages, including ones still in molds and others almost ready for launching. A boatyard is not just for storage of old molds!

Hot Deal or Getting the Quote

Okay, now you've got a quote from the builder. What has to be checked? In our experience, some builders in Thailand will give under-priced quotes. Say, the builder is asking 1.7 million baht for a 38' catamaran, without engines. Now we have to use a calculator and check it. The weight of the structure of such a boat is about 3,000kg, and the cost of the cheapest fiberglass is 500 baht per 1 kilo (including materials and labor) for an existing mould. So we get 1.5 million baht for the structure of this boat alone. Now we know that for this money, one can get only a bare structure built in fiberglass, without equipment, windows, stainless parts, the interior, etc. Or you can get a substandard hull (thin laminate) with some equipment. So this boat will be "delivered" as substandard or incomplete, or the builder just wants you to agree and then ask for extras.

Sure there are many factors affecting cost, but in general the cost of a boat is in proportion to the displacement (i.e. weight) of the boat, or approximately to the length cubed.

The minimum prices for a reasonable quality, fiberglass production boat excluding engines in Thailand are:

- 6m boat – from 600,000 THB
- 8m boat – from 1,500,000 THB
- 10m boat – from 3,000,000 THB
- 12m boat – from 5,000,000 THB

If the proposal you get is much cheaper, try to find the reasons and look for hidden costs.

Fig.6 – Hulls of 9.8m aluminum powerboats ready to be shipped from BPMarine. *This quality builder is often our customers' choice for aluminum boats.*

Boatbuilding Contract

Each builder uses his own contract, so generally most of them are written in favor of the builder's company. It is best to check the contract with a lawyer in the country of production. Major questions include: Does the customer own what has been paid for? How are stages of construction confirmed? What are the consequences of delays with progress payments? Given that it is not easy to control time schedules in Asia, most building contracts do not have delay penalties... But on the other hand, nobody will ask you to deposit the full amount in an escrow account!

Typical Payment Schedule

The typical payment schedule for ordering a boat is as follows:

10% on booking;
30% on start;
25% on join of hull and deck;
25% on installation of engine;
10% after sea trials and delivery

This is well proven schedule. If you have paid 80% and have no equipment installed, something is definitely wrong with your build!

Prior to paying for the next stage, make sure the previous stage is complete (though sometimes this is not possible – subject to discussion with the builder). Make sure that the boat the builder shows

you is your boat – check the affixed hull identification number (it should be on the transom) or other signs. The same rule applies for equipment installation – make sure it is your equipment. Of course, these checks are not required if one trusts the builder.

Fig.7 – Construction of 32' powercat at Andaman Boatyard. *Amazing woodwork quality and the artist's eye on every detail are the features of this builder.*

High-Tech Building

Look carefully at "high-tech building" promises. Many builders in Asia claim to be such, but in reality this is just a reason to charge more and build slower with an unknown result. In my opinion it is better to have a fair and reliable simple laminate, than an "infused high-tech" hull laminate with dry spots (yes, the builder just trained his team on your hull!). From our experience, most of the so-called "high-tech builders" in Asia produce hulls that are considerably overweight.

In any case, high-tech construction cannot be done just under a shed, without a temperature and humidity controlled environment. Look at the facilities and see if those are provided.

For Asian builders, we tend to propose simple building solutions to ensure that the desired craft can be built. For builders whose quality we know, we do design high-tech laminates also.

Weight Control

This is one of the key issues for a successful project, especially if we are talking about planing powerboats or sailing catamarans. It does not matter how light and attractive your boat is on the drawings, if in reality it is 50% heavier. There are two main factors for overweight construction on a properly designed boat: extra equipment added by the owner during construction and structural/interior weight from the builder. For example, extensive use of filler will significantly increase weight, and lack of control of resin content can lead to 20% heavier laminate. Make sure the builder checks the weights of moldings during construction. Keep your appetite for equipment within reasonable limits – make sure the weight of those items will not sacrifice performance and safety.

We tend to design boats with "fair weight" – for example, our SV45' sailing catamaran design is an 8,800 kg lightship that includes an air-conditioning system, generator, full set of separate starter and service batteries, some amount of teak on deck and a margin for structural weight.

SAVING MONEY

Saving on Design – a Perfect Way to Project Failure

The first money-saving idea that occasionally comes to a boat dreamer's mind is "Do we need to pay for a design? Do we need a design? I think we don't need a detailed design, we have enough photos of the boat of my liking in the magazine! Yes, we will modify the existing mold and make a cabin that looks like the photo! The builder promised he can do that!" Unfortunately, this is the way to nowhere. This approach has a 100% guarantee of the project's failure - the money will be spent, the boat's shape will not be as required and basically the boat will not perform.

After the disappointment of sea trials, such an owner will turn to the naval architect and ask him to help, but I know no reputable professional willing to put his name to such a project.

So, what should be done? There are few options:

- Order a production model and don't worry about design
- Order a production model with customization
- Buy a kit - You will get parts precut and shipped to the builder, together with assembling plans
- Buy a stock design – often a less expensive solution, some small customization is possible
- Order a custom design from a designer you trust

When choosing the designer, consider his experience in working with Asian builders and his ability to provide a complete design package. Asian yards don't have enough imagination (or experience) to build from general arrangement drawings only. Knowledge of locally available materials and equipment is important for the designer. Our experience shows that to design a fool proof kit for Asian yards is not an easy task due to differences in mentality and culture, as even the way one puts dimensions on drawings is critical.

Less Expenses, More Headache

"I'll hire workers, rent a place and build the boat for cost! Why pay more?" Bad idea, in my experience all who have tried it ended up with a lo-o-ong build or incomplete project, and a hull standing on a rice field has no resale value...

Average delivery periods for equipment

Category	Delivery time
Inboard engines, 100-900hp	*12-20 weeks*
Inboard engines, above 900hp	*20-30 weeks*
Outboard engines	*8-16 weeks*
Marine generators	*8-16 weeks*
Engine accessories, spare parts	*4-8 weeks*
Propellers, shafts	*8-16 weeks*
Navigation equipment	*6-10 weeks*
Deck equipment & hardware	*2-8 weeks*
Parts for systems, electrical and plumbing	*2-8 weeks*

Ordering the Equipment

"I will buy the equipment myself!" – will be the next boat dreamer's thought. Yes you can, but did you know that boatbuilders buy equipment with discounts? Then, do you feel confident to judge the specs in the quote? Will you choose correct parts? Will there be enough cable for connections? Are you willing to clear customs and ship the goods back on your account if there is some error? Are you confident all the items will arrive properly, and are you ready to pay for air freight?

Form our experience, this "I will buy equipment myself" approach gives illusive savings. You will pay for all mistakes from your pocket, and the builder will still charge for installations, for consumables and for a lot of small items. The only justified "direct buy" option is for easy to install items such as sails, some navigation (provide space to install cables later), cabin equipment and safety items. There is a "customer supply, builder install" formula in a boatbuilding contract.

In fact, all equipment purchased by the customer (who will likely wait until the last moment to order!) usually comes too late, which gives the builder the right to charge extras for keeping your boat in his yard as well as a reason for delays. So in the end, what are the benefits?

Real Ways to Save and Avoid Delays:

Our experience shows that once you are working with a good yard, there are still two reasons for delays: delays with payments and changes during construction. Using a clear design and clear specifications for quotes and building is vital. Of course, if the yard does not perform and asks for extras every month then you picked the wrong builder!

Supervising the Build

In general, supervising the build is a good idea. It can be done by the designer, by a private surveyor, by a classification society (i.e. official surveyors) or by the owner's representative, who possesses the required knowledge. I would say that sometimes third parties involved in a build are harmful for the project – the builder will not like someone who will criticize his job and stick his nose in the process. In any case, involvement of people with a lack of knowledge of boatbuilding practices will sometimes cause conflicts with the builder that will not benefit the project.

CONCLUSIONS

In general, building a boat in Asia is a creative adventure and an act of cooperation between the designer and builder, not just a commercial enterprise. Visit your builder often and experience the unforgettable flavor of Asia, learn the traditions from communication and enjoy tour sea trials here any time of year. Finally, the experience of working in a multicultural environment is a free extra you get by ordering a build. Many of our customers have registered their boats in Asia or have brought new projects, willing to come to this beautiful spot again and again.

ACKNOWLEDGEMENTS

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