The G-Force 1400C

Study Plans

Schionning
DESIGNS

Design Overview

G-Force 1400C

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Specifications	
LOA	14.45 metres
BOA	7.65 metres
Draft	0.525 metres
Headroom (Hulls)	1950 mm
Headroom (Bridgedeck)	1950 mm
Mast Height	18 metres
Sail Area (Main+headsail)	68 + 42 sq metres
Payload	2000 kg
Displacement	6600 kg
Bridgedeck Clearance	0.950 metres
Beam to Length Ratio	14.4:1
Motor Option	2 x 20-30hp Diesels OR Diesel Electric Option
Cruising speed	16-19 knots
Top Speed	20 knots +

The G-Force 1400 was the first G-Force design, and it really blew the competition out of the water, literally! But many customers needed something that was a little more "cruising-friendly", the light weight construction and somewhat diminished payload was too radical for those cruisers that only wanted to compete in the odd regatta with majority of their time spent exploring and relaxing. And so began the introduction of the G-Force 1400C (Cruise), a lean mean cruiser that can get you to those beautiful destinations quickly, but with a little extra comfort.

The G-Force 1400C is a little longer on the waterline than some of her other G-Force sisters, and this helps to accommodate the additional weight carrying capacity. Accommodation is comfortable, but is still light enough to keep the performance interesting. Two queen berths are situated on the bridgedeck forward, with separate access from each hull. In addition to these, a double cabin aft in the starboard hull and single bunk forward of the port queen. A shared head and shower aft in the port hull accommodates both the forward queen and aft double. The "owner's cabin" is forward to starboard, with a private ensuite head and shower, hanging lockers and storage.

The saloon, galley and nav station are situated on the bridgedeck which has full headroom. The galley is situated to starboard, with U-shaped saloon seating to port, with no division between the two this area is very open and social when cooking or preparing drinks. Large drop-down windows open out onto the cockpit giving the entire bridgedeck unimpeded views out of the cabin windows, and this adds to the spacious modern feel. The cockpit features walk-through transoms which is ideal for the cruising lifestyle and makes swimming and boarding easier for the whole family, even pets!

Steering options include tillers, single or twin helm. Builders can look at making their own composite wheels connected with spectra rope, it's a little more work but very easy and cheap to build. The G-Force hull design gives the 1400C impressive performance in both light and cruise mode, she will tack easily, be very fast when light but carry a good pay-load when cruising, achieving the best of both worlds.

G-Force 1500 "Chill Pill"

Motor options are either the normal twin diesel option, the port motor is in a separate engine room aft of the head area while the starboard motor would be set under the aft bunk. Our preference is shaft drives allowing easier beaching and with twin folding props less likelihood of snagging fish traps and buoys when underway. An option is one 40 HP diesel to port driving a 48v generator with a DC 4KW motor to starboard. These coupled to a decent bank of lithium batteries allows silent electric propulsion where needed and the diesel used as your main power for straight-line motoring and doubles as your genset.

The G-Force 1400C uses our normal daggerboard system and preferably kick-up rudders as these are far less likely to get damaged in a collision with submerged or floating debris. Unfortunately this is a very real concern now with our oceans the dumping grounds for many countries. So much easier to simply raise the board then kick up the rudder to free ourselves rather than trying to cut lines from deck or worse having to dive in!

Construction uses our Schionning build system, which is arguably the best by far in the world for light, strong, one-off construction. We use a combination of strip planking for compound curved areas with flat composite panels for all single plane areas, this produces a beautiful blend of curves giving a fantastic end result. We use Epoxy resins and knitted fabrics with light balsa or foam cores for unrivalled strength, stiffness and very light structures.

When building your own multihull, there are several factors that can blow out the project budget. Firstly internal volume costs money, so keep her simple and you'll keep your budget under control. Secondly, the "must-haves" – are they really necessary? It is far better to launch with what you actually need then add the toys as you want and can afford them. For example, these days we can simply navigate with our smart phone or tablet rather than buying expensive electronics. Budgeting your project well at the beginning will eliminate any unexpected surprises down the road at launching time.

The GF1400C is light and has very efficient hulls providing good power to weight ratio which allows us to have a moderate size rig, yet very good speed. This keeps cost down and safety very high. Mast choice can be either a fixed alloy or carbon rig or a rotating carbon wing, these are all good choices for cruising. On the rotating wing we would keep a 2:1 cord section so that the boat behaves normally at anchor and doesn't have a tendency to 'sail' causing problems. One advantage of a wing mast is that it is easy to reef when running before the wind, avoiding the necessity to round up into the wind, this is a good safety feature when cruising. Sails would include fully battened main, overlapping jib or self tacker, screacher and asymmetric spinnaker.

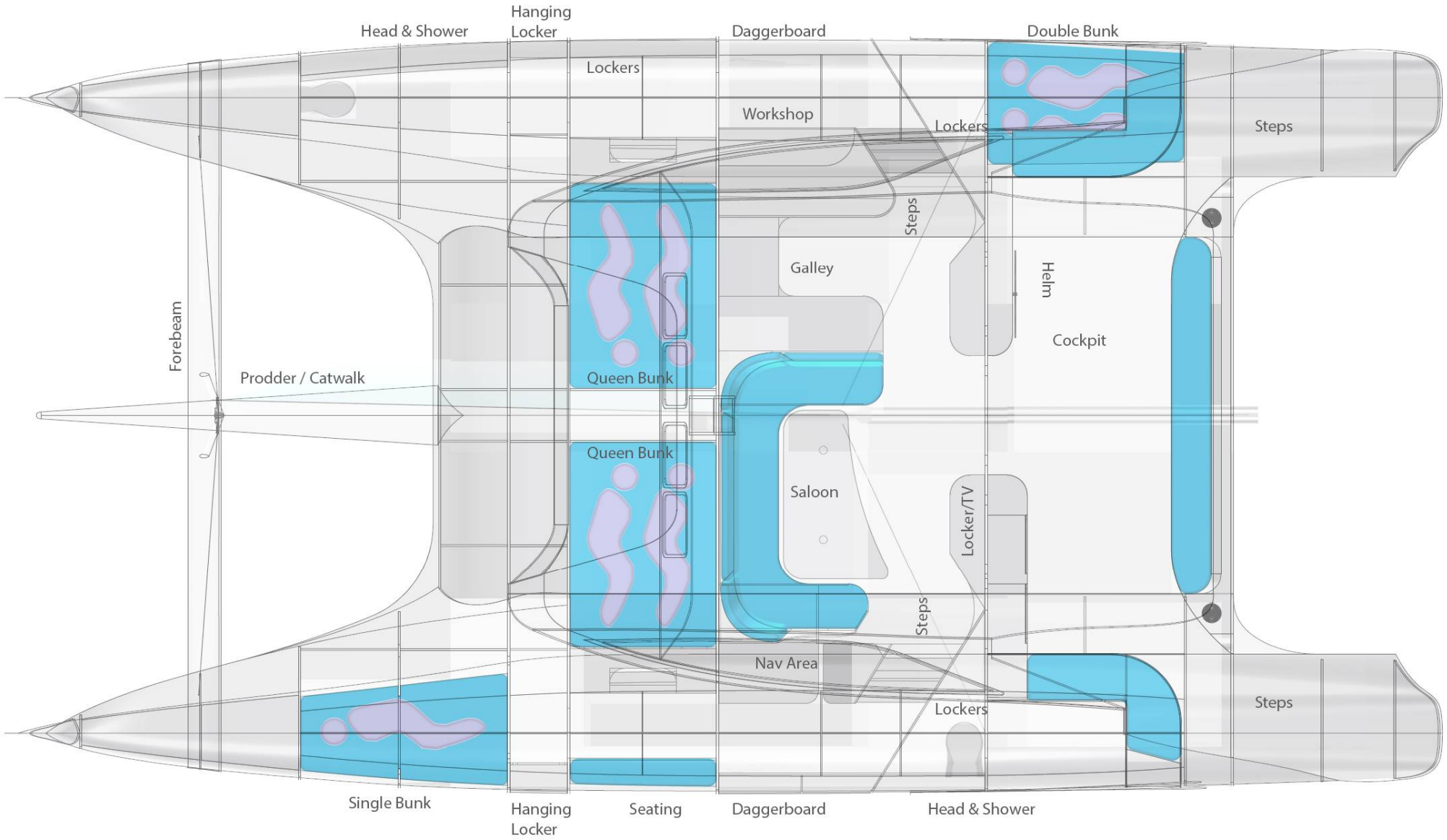
Safety is very important to us, we perfectly balance the sailing performance without compromise and coupled with our engineering and high safety factors in key areas. We have high reserve buoyancy in the bows to prevent burying, leaving many compartments sealed as buoyancy tanks, many of these will be high up in the unlikely event of capsize. The bottom section of the hulls below cabin sole makes up a massive box beam for strength and worry-free beaching.

The G-Force 1400C is a very easy catamaran to build even with no previous experience or if you have the means, ask one of our recommended builders for a quote and get out on the water sooner.

This is a very capable ocean cruising design - the luxury of good waterline length makes her fast and comfortable and while she is big enough to offer real comfort she is small enough to single hand or to be sailed easily by a couple. She will make you smile if you do a bit of club racing, able to show most a clean transom heading over the horizon.

So what are you waiting for?

G-Force 1400 "Bulletproof"


Head & Shower
Hanging Locker
Lockers
Daggerboard
Workshop
Double Bunk
Lockers
Steps
Steps
Galley
Helm
Cockpit
Forebeam
Prodder / Catwalk
Queen Bunk
Queen Bunk
Saloon
Locker/TV
Steps
Nav Area
Lockers
Steps
Single Bunk
Hanging Locker
Seating
Daggerboard
Head & Shower

Material Overview

G-Force 1400C

Schionning DESIGNS

Our designs are based on cored composite construction techniques using West System epoxy resin and knitted fabrics. But given the range of today's composite technologies, which solution works best for catamarans and why?

Resin Choices

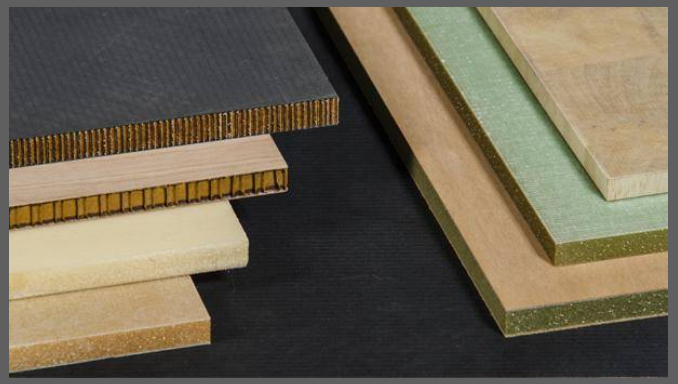
We use West System epoxys for their high strength and adhesive values. It also fully protects the boat against water absorption and it can not develop the dreaded Osmosis. We choose ATL Composite's resin systems for their superior quality, reliability and value for money. Having worked closely with the ATL Composites team and their products for many years, we know we can stand by their material solutions, and rely on great service should something unexpected happen.

CORES - Which one to use?

The core choice is usually quite confusing. Cores have different capabilities and properties, and their benefits I feel are utilized fully in our catamaran designs. A quick look at their abilities:

Balsa end grain (150 kg/cubic metre) has exceptional qualities including very high compression strength, extremely good sheer capabilities and fantastic sheer stiffness. Compressive strength is the resistance to collapsing when pressure is applied perpendicular to the surface as when pushing directly onto the material with the point of your finger. Balsa is far stronger than Foam (80kg/cubic metre) in compression. Foam is stronger than honeycomb type cores, both the paper and the plastic.

Balsa is also far better than foam or honeycomb in sheer. This is when the core sample is held flat between your hands, one hand slid one way and the other slid the opposite way, when the core tears through the middle the core has failed in



sheer. The amount of stretch you feel before the core shears is shear stiffness. To compensate for sheer weakness the core is made thicker. So 13mm Balsa may be equal in sheer to 19mm Foam.

Our hull skin thickness is quite thin, we therefore find the core works harder and it's stiffness is noticed in the finished structure (sheer stiffness). Generally a balsa or WRC shell is noticeably stiffer than a foam boat using equivalent laminates. Balsa has very good values and we can produce a shell using a very light laminate. It will be very stiff and very resilient to fatigue.

There are many boats sailing that are built from **foam** so even with its poorer values it works well. Initially one would expect this cat shell to be lighter as it is ½ the weight of Balsa. We do have to compensate for its weaknesses and will then add at least double the reinforcement on the outside to spread that compression load over more core and need a triaxial type weave to compensate for the veneer content that runs fore and aft on the Durakore. Secondly, we need to increase the Core thickness to compensate for the shear value, usually neutralizing the weight advantage. Thirdly, foam absorbs a lot more resin into the open surface cells than timber and so increases weight. Fourth, foam is an inert type material tending to follow the surface and not naturally stay fair, fairing usually uses more bog and again adds weight. Fifth, because of the inert characteristics, foam requires a much more complex control mould, this takes a lot more time and is slightly expensive.

The end result using Foam in my experience is always a heavier shell with less stiffness. Professional builders can achieve a good result but usually use vacuum bagging and very good molds to achieve this. The Wilderness 1230 has a foam option. It weighs 200kg less than the Balsa version.

Western Red Cedar has all the advantages of strip Durakore, but has a real weight penalty because of its higher core weight.

These are the reasons we prefer Durakore and Duflex Panels for our home built designs.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The success of our designs I feel, stems from the practical commonsense approach of a boat builder, coupled with many years of live aboard experience and 50 - 60,000 sea miles in some of the worst conditions in the world. This experience makes one aware of the power of the sea and the need for a boat to be able to survive these conditions, protect her crew physically and psychologically as well as being a fast comfortable vehicle for all the good times. I am sure you will find our designs reflect our sailing and liveaboard experience and will give you the offshore confidence to sail safely anywhere in the world. Multihulls are '*beautiful, safe, cruising boats'*. We hope you find them as exciting as we do.

CHOOSING A DESIGN...

Choosing a design can be difficult so we hope that this introduction helps clear the way a little. We've taken particular care with the balance of construction methods in our designs, making them light and strong yet easy to build in small sections, most of which are manageable by a group of friends when they need turning over and moving. The blend of strip planking and light flat panels kept in single plane form, makes building easy and quick and produces a finished catamaran of classic good looks which will not date quickly, giving you very good investment security. One of the first steps in changing this dream into reality is figuring out whether you can afford the boat (or more likely, how much money you 'don't' have!). Two realities here are, firstly, two similar sized boats with similar displacement, built of similar materials will cost the same to build overall. Designers' estimates of materials are often inaccurate and sometimes minimized to lead one to believe their boat will be cheaper.

This is definitely not the case, ***similar boat, similar price!*** Your choice should therefore be towards the boat that suits you best and offers you good backup and is a good investment. Secondly, we know a lot of people who could not afford their boat at the onset so don't be discouraged.

Once you start building it is surprising how you focus your interest, spare time and money into your new project. With our new owner-builders we suggest they start with the smaller items which can be built in the garage, carport, (lounge?) etc. These initial items use very little material and money but use a lot of time, so at the early stages you can get a lot done while you wait for your old boat or car or house etc. to sell.

These items are; dagger-boards and cases, motor pod, forward beam and catwalk, cabin roof, rudders, dinghy etc. The experience and confidence gained building these bits speeds up the second stage of larger items and gets the whole project finished much sooner.

WHAT MAKES A GOOD MULTIHULL?

Cat design is not just a matter of two hulls floating a cabin above the water. Only in fairly recent years have the basic elements of design and an understanding of their effect on the use and performance of the finished boat been understood.

The basic principles of good design should all be present in the boat you're considering building or buying. These will blend together to produce an excellent Multihull.

THE BASICS ELEMENTS OF A GOOD DESIGN:

GOOD ENGINEERING. Our boats are well proven.

FLAT DECKS. The flatter deck lines have a number of advantages. Secure footing while reefing, anchoring etc. in rough conditions, life lines are at a sensible protective height instead of set down a level. A flat deck is great for socializing, sunbathing or as a kids playground.

BUOYANCY. Buoyancy distribution is the placement of buoyancy in the hulls. Our designs have between 50 and 60 separate buoyancy tanks built into every shell so they are almost unsinkable. Most old designs hobbyhorse a lot making them uncomfortable and inefficient. Modern designs have the buoyancy pushed towards the hull ends damping down the hobby-horsing tendencies and giving a lot more safety downwind where the buoyant hulls stop nose-diving. Coupled with a lot of reserve buoyancy higher in the forward hulls this adds an enormous amount of safety and gives you confidence off the wind.

A soft 'V'd entry, quickly picking up reserve buoyancy with lots of reserve higher up is and ideal combination.

BRIDGEDECK CLEARANCE. High Bridgedeck Clearance is essential. A short cabin length with long hull overhangs is a good safety feature. Good clearance on a cruising cat is 600mm – 800mm, a Performance cat 700mm – 900mm and a Racing cat 800mm – 1000mm. Chamfer panels add high reserve buoyancy and need less clearance than a similar cat without them.

SAILING ABILITY AND PERFORMANCE.
Power to weight ratios show how well a cat will sail in light conditions. As wind strength increases, one reefs the power to stay at safe acceptable speeds (this is different for different people). The Bruce Number is a commonly used value and very useful in comparing cats, displacement is not always reliable and will vary with load. A Bruce Number = 1 is very slow, 1.3 – 1.4 is a good cruising value, 1.5 – 1.9 reflects a very fast cat. Boats like the French 60' Tri's and "Club Med" are running to extremes like 2.3.

A light and efficient cat can often sail out of trouble and outrun severe weather patterns, shorten passage times and avoid bad weather by getting there in the existing weather window. Most good designs will tack through 90 degrees at a speed of 8 – 10 knots while reaching at 10 - 13 knots comfortably with Main and No. 1 in 15 knots of wind. Daggerboards are efficient and allow very shallow draft for beaching. With a strong reinforced bottom as per our designs, it's easy to run the cats up on any old beach. Should you want shallow keels to protect inboard motors, then a combination of shallow keels and fixed rudders are a good option, daggerboards would still be fitted as usual, giving the best of both worlds.

LOW DRAG. This is a good characteristic. Slim hulls reduce drag and are efficient. A good cruising cat would have a Waterline beam to length ratio of 11.5 to 12.5:1. A performance cruising cat 12.5 to 14:1 and a racing cat 14 to 20:1.

It is important to note that *ALL* these elements must be present in a design to make any of them valid. For example, a design can be really good looking, have high bridge-deck clearance, a powerful rig and sail plan and be built reasonably light and show a fair displacement, but then have an 8:1 Beam to Length ratio. She'll be a good looking, powerful boat but it will be impossible to go forward, except slowly!

There is no reason why a good modern design does not have all of these features. If you find some of these lacking it is usually for the wrong reasons. A lot of cats have very little bridge-deck clearance because the designer is concentrating on a low profile cat which looks good or being dictated by interior accommodation and ignoring the fact that the boat will pound badly at sea. This is not only noisy and uncomfortable but can well be the cause of structural problems.

Our designs have been developed around these practical elements of good design then we accommodate personal comforts and lifestyle choices.

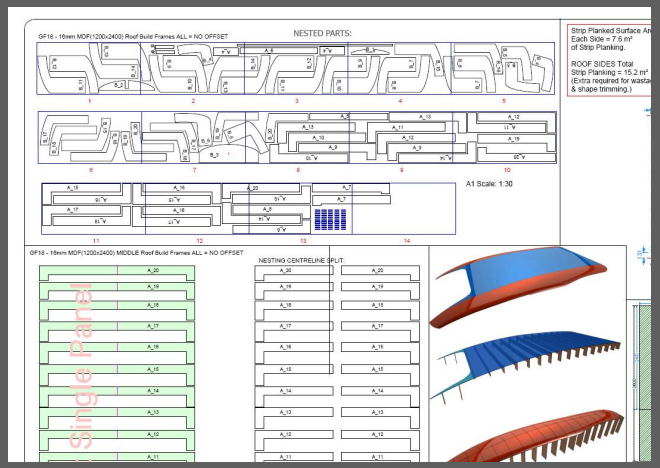
Good luck with your research and project, don't hesitate to contact us should you need further information or a chat about our designs.

Jeff Schionning

Plans and Ordering

G-Force 1400C

Schionning DESIGNS



Advice is readily available to help with your design choice and various options available.

COST OF PLANS:
The G-Force 1400C Plans are **AUD$18,000.00**. This includes postage anywhere in the world.

UNLIMITED BACK UP SERVICE: Our back-up service is unlimited, our professional boat builder will be here to guide you through any problems throughout your entire project. Email and phone support is available during business hours Monday to Friday.

HOW TO ORDER PLANS: We require a signed and faxed or mailed PLAN ORDER FORM with every plan order. This form explains the terms and conditions and plans will not be mailed until a signed order form is received.

PAYMENT: WE ACCEPT: Bank cheques or direct deposit into our bank account. Please email info@schionningdesigns.com.au for our account details. Credit cards are not accepted for plan purchases.

SHIPPING: Plans are sent by express mail within Australia and by courier overseas at no extra charge to you.

Building a boat is definitely a challenge but with good plans, our helpful friendly support and the modern materials available, it's never been easier. The investment of time and money is very worthwhile, offering a rich life experience, fun reward when you launch her and financially you can certainly stand to gain substantially.

We look forward to hearing from you again and wish you the very best with your project.

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