



# MATERIAL WORLD

From titanium to oyster shells, from carbon fibre to crystal, the wealth of materials used in superyacht design and construction today has never been more diverse. For the Technical Consultancy Services team at Burgess, this raises challenges as well as expectations.

In the past fifty years of superyacht design, the range of materials used to create these magnificent vessels has changed dramatically, driven by two key factors. One is demand for yachts that are aesthetically spectacular, with longer range and better performance. The other is a changing regulatory environment.

#### FORM AND FUNCTION

Most large yachts over 50 metres are built with a steel hull and aluminium superstructure. Specifying grades of steel and predicting how materials will react to certain conditions are everyday calculations for the Technical Consultancy Services (TCS) team at Burgess, but few owners get involved in these basic engineering decisions, which are critical to the performance of the yacht.



Whether it's sandstorms or ice, climate makes a difference to the lifespan of materials.

Technical manager and marine engineer, Ray Steele, has noticed a change in superyachting. *"More yachts are spending extended periods in the warmer, saltier waters of the Middle East and Indian Ocean, or heading into Arctic waters. If a yacht is destined beyond the Caribbean and Mediterranean, it requires careful consideration of the hull construction and specialist protective coatings."*

Galileo G is a good example. Built on an established concept by Picchiotti, her sistership had been all-aluminium, but because Galileo G's owner wanted to explore the North West Passage, she needed an ice-class, steel hull.

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The only other industry where carbon fibre is being pushed like this is in Formula 1.

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#### CARBON FIBRE CREATIVITY

For yachts under 50 metres, composites come into their own. Today's advanced plastics are reinforced with many new fibres, including carbon, Kevlar and other aramids. Each fibre has different qualities, such that each composite is suited to different applications. Glass fibre, widely used in production boat building, is not the 'new kid on the block' but its low impact on radio waves makes it good for use in radars, domes and antennae. Kevlar has good shock resistance. Carbon is stiff and light, ideal for sailing yacht masts or structures where weight is an issue, such as foredeck cranes.

In fact, carbon fibre is a game changer. Structures that were simply impossible under the limits of metallurgy can now be engineered. Dramatic, curved superstructures and shapes that are both strong and lightweight can be realised, leading to incredible designs such as the towering, unstayed uni-rigs, or the Falcon Rig on Maltese Falcon.

*"The 90 metre mast of Mirabella V was the largest carbon fibre structure in the world when it was built," recalls project manager and naval architect Sean Bianchi. "We have used the carbon fibre expertise from the McLaren F1 team to help adapt the technology for yacht building."*

Meanwhile, new metals are appearing where once stainless steel was the only choice. Sean Bianchi: *"We are seeing more exotic metals for exterior fittings exposed to the elements. We recently used titanium for handrails, for example."*

Another option for deck fittings is to use an innovative protective coating. Aboard the J-Class Shamrock V, the exterior gear was treated with a novel and robust anodised coating, eliminating the need for regular polishing.

#### INNOVATION ON DECK

All new materials need to stand the test of time. Take teak, for example, long considered the ideal material for deck covering. Warm, non-slip and soft underfoot, yet hard and containing natural oils protecting it against the sun and sea, it has been hallowed by sailors for centuries. There are however grave concerns about its sustainability. The slow growth of the finest quality varieties has led to increasingly short supply and although owners may 'offset' the teak used on a yacht by replanting or protecting areas of rainforest, supplies are diminishing and it is incredibly expensive. Given the vast deck areas of today's megayachts, the search is on for alternatives.

Naval architect Rory Boyle adds: *"Steamed ash, laminated bamboo, reconstituted cork and resin-infused maple have all been used with varying success and have evolved impressively."* Using different treated woods offers designers a new palette of colours, from pale grey to wheat, buff or dark brown. There are some strong synthetic contenders for decking in tender bays and dive centres too, such as Esthec by Bolidt, very hardwearing and far removed from the pallid 'plastic decks' of the past.

Among designers, the desire is not so much to mimic teak, but to do something extraordinary. Ceramic tiles or stone, like the pale limestone terracing used so effectively on Kogo, can deliver a fabulous barefoot sensation and look spectacular. Incidentally, the secret behind those solid-looking slabs of stone (which would add intolerable weight, were they actually solid) is an aluminium honeycomb structure onto which the thinnest slice of stone 'veneer' is mounted.

Titanium is light, corrosion-resistant and is virtually maintenance-free making it good news for the crew!



## INTERIOR MATERIALS

Inside a yacht's living spaces, wood becomes problematic again, but for a different reason. "Yachts are getting bigger. When they reach a certain size, or if they carry more than 12 guests, they will fall under the Passenger Yacht Code," explains Ray Steele. "This has big implications for the choice of materials, because your yacht has to meet the same fire safety standards as a Passenger Vessel."

The Burgess TCS team has been part of the panel developing the new Code, which gives them a direct insight into the regulations. "On a cruise ship, you can use fireproof materials looking much like formica," says Rory Boyle. "But our clients require specially tanned leathers, alligator skin, crushed oystershell, or fine rosewood - formica just won't do!"

TCS, interior contractors and designers have to go through a lengthy process of sourcing materials certified to comply with rules that specify the maximum levels of combustible material in each interior space.

Fire testing literally means setting fire to something and measuring the energy, smoke and fumes released as it burns. Obviously that is not practical with very rare or unique items. Nor is it always feasible to apply fire-retardant treatment to unusual textiles and furnishings, where lustre, colour and quality are all important.

This requires a continual refinement of calculations and juggling of kilojoules. If a designer insists on a solid wooden handrail for a staircase, then perhaps you use stainless steel for the toe treads, to reduce the overall combustibility of the space. "The key is to eliminate as much combustible material as possible behind the scenes," says Boyle. "The basic substrate of large yacht interiors used to be wood. Now under Passenger Ship regulations it is non-combustible board or aluminium honeycomb."

As ever, necessity is the mother of invention. The new rules are pushing the use of new techniques and new materials. The raw silk panelling in the master suite is backed onto Nomex, not plywood. The bar feels like solid oak, in fact it's 2/3 aluminium, and that's a high quality printed 'trompe-l'oeil' panel behind the bar. "The focus is on those areas where there is direct interface with the owner and guests," says Sean Bianchi. "Most of the effort that goes into fire safety compliance should be invisible to them."

As Rory Boyle puts it: "What is the calorific value of a Picasso? If you want to have an ancient flag from HMS Victory in the main saloon, or that wonderful piece of driftwood from Tahiti, of course you can. It's our job to make sure that it's possible."

1070m

Total length of yachts currently under construction/development with Burgess

23 shipyards

Where Burgess has worked on new build projects since 2001

€1.8 billion

Total value of projects currently under construction/development with Burgess

4 Passenger Yacht Code vessels

Number of Burgess megayacht projects, three of which are currently under construction

110m

The largest yacht ever built in Holland, for which Burgess has been appointed project managers



Delivered in 2012 by Devonport Yachts (now Pendennis Plus), the 96m VAVA II is the largest private yacht ever built in the UK. All technical aspects of the build from conception to delivery were supervised by Burgess TCS, including extensive studies on noise and vibration. VAVA II has a multitude of unique features, including state-of-the-art bridge systems with full dynamic positioning, an innovative glass elevator, a variable depth swimming pool, a private helideck with refuelling facilities and what is probably the largest water level beach club afloat. Built to the very highest specification and to the Passenger Yacht Code, VAVA II sets a new benchmark in superyacht construction, safety and design.