Living in a material world

From discarded mussel shells to rot-proof hulls, we profile three pioneers changing the nature of superyacht materials – they all benefit the environment, and you may already have some on board without even knowing it

She sells seashells

Lay Koon Tan and her Nature Squared company recycle both natural and discarded materials to make beautiful interior pieces for your yacht and home

There are many materials one might expect to find aboard a superyacht – marble, leather, gold, glass. But it may come as a surprise to learn that, thanks to a celebrated little company called Nature Squared, some of the largest yachts in the world are in fact brimming with commonplace, everyday products – even discarded waste.

The crackle-effect exterior of the tub in the bathroom of the master suite of 89m *Nirvana*, for example, is created from mere broken eggshells. And the glistening basins, vanity unit fronts, soap dispensers and tissue boxes in the owner's bathroom and hair salon of Samvel Karapetyan's 85 metre Lürssen *Ace* are similarly made from oyster shells that were otherwise to be discarded, having reached the end of their pearl-producing lives.

All were created by Nature Squared, a company based in Jona, in northeast Switzerland, that specialises in the creation of distinctive and unusually beautiful inlaid surfaces based on materials found in the natural world. Crucially, all are sourced responsibly.

"On *Ace*, we were really specific about the colour tone that we wanted," says Selina McCabe, Winch Design's senior manager, yachts, who has been working with Nature Squared this past decade. "Even when you're working with a natural product, our clients like to specify precise tones. Nature Squared had to source these shells and ensure that only the part of the shell that met with our client's demands was selected. Slightly too much green or blue in one area, and the whole thing would have to be made again. Sometimes they'll produce 20 samples of just one finish, and we might be doing 10 finishes."

Unlike most suppliers of products to this market, however, Nature Squared's motivation is about more than manufacturing and profit. Set up in 2000, it was intended, say founders Lay Koon Tan and Paul Hoeve, "to create meaningful, sustainable employment in developing countries", hence the fact that the company belongs to a charitable trust.

I meet Tan, a petite powerhouse of energy, enthusiasm, ideas and ideals, at her unassuming basement studio in southwest London, a scatter of samples spread before us. The colours, textures and patterns speak of richness and rarity. In many cases, however, the essential natural component turns out to be commonplace: eggshells, nutshells, seashells; all, she stresses, sourced responsibly, mostly the byproducts of the fishing and farming industries and never rare or endangered. Before us, for instance, there are examples of wall coverings and worktops made from various seashells: slate coloured tellin, brown and black hatchet, hammer and troca, the pearly white clam-like casings of the latter etched in growth lines in a sort of conchological expression of art deco.

I ask what the gleaming, intriguingly inky blue-black panel is made from. It turns out to have been created out of mussel shells (mounted on a metal honeycomb composite), just the sort you might order as marinière with a side of frites but transformed into a seductively glamorous, highly durable surface that has recently been used for the basin surrounds in all the bathrooms on a yacht launched last year. "Shell is calcium carbonate," says Tan practically, "so unless you're planning to spill acid on it, nothing much is going to harm it. You can laminate it, but here it is just polished."

The mussels from which the panel is made are farmed, as is the abalone, which comes from a community-based project in South Africa. The shellfish are canned and exported and ordinarily the shells would be thrown away. "So what we do," says Tan, "is pay the farmers for the clean shells. It enables an alternative route to market for things that would otherwise be discarded. It monetises something that doesn't otherwise have value. It gives them an alternative source of income. And then we turn them into surfaces."

But Tan is concerned with ideals as well as aesthetics. Abalone is not just a desirable decorative surface. It is also "terribly important", she says, to encourage a legitimate trade in it to try to combat poaching, which can also see it "smuggled through countries like Lesotho and Swaziland, that ironically don't have coastlines", so fuelling, she's been told, the illegal arms trade.

Nature Squared works with more than shells: there are leathery looking surfaces made from tobacco leaves (just the thing for a cigar smoking room or a humidor); fish skin (though never shagreen); the giant kapok seed pods and the bark of abaca trees; reeds ordinarily used for thatching; peacock, duck and guinea fowl feathers; horn; bone; even stone. "We recently put 70 tonnes of jade" on a boat designed by Christophe Leoni, "as well as 150 tonnes of shell." They refuse to work with Afghan lapis lazuli any more, though. Too much of it was passing through Taliban hands.

It's no wonder, given the eternal search for rich and strange materials that no one has seen before, not to mention ethically uncontroversial ones, that yacht designers cannot get enough of Nature Squared's creations. "We have products on maybe 90 per cent of the boats ▸

Words – Claire Wrathall / Portrait – Eric Frideen

Lay Koon Tan co-founded Nature Squared in 2000. Part of its aim was to combat the view that developing countries are primarily a source of cheap labour and low quality

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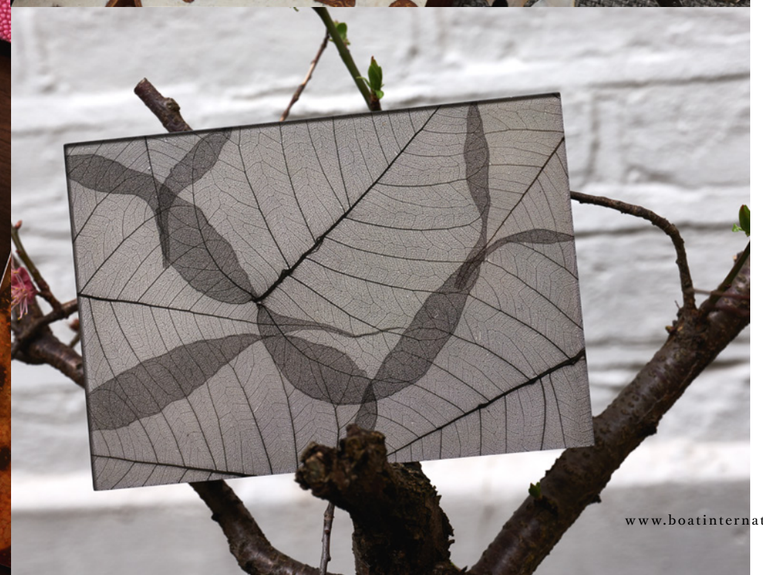
Nature Squared's R&D division develops a wide variety of surfaces and luxury products from all sorts of natural materials, including, displayed above right, tobacco leaf, skeletonised leaf, perforated pili nut and pearl shell fluting



over 90 metres or 100 metres that have launched over the past few years," Tan says.

"We're doing a project at the moment where we have in the region of 380 specialist finishes," says Fiona Diamond, of Seymour Diamond, who has designed the interiors of more than 30 superyachts. "And I think Nature Squared are making at least 40 of those. The diversity and versatility of what they do is extraordinary. We've developed so many different finishes with them, all of them customised to the owner and bespoke. They do go that extra mile to ensure the quality of what they produce. But the thing that stands out for me is their passion for local communities and what they do in providing employment and trade, enabling benefits from the company to feed back."

Tan and Hoeve met when both were partners at Arthur Andersen. Hoeve, who is Dutch, spent 35 years there, rising to head the offices first in the Netherlands and then in Switzerland; and Tan, who grew up in Kuala Lumpur but went to school in England, qualified as an accountant before branching into management consultancy. By her mid-30s, however, she was ready for a change. "When I left Andersen I thought I was going to join the United Nations or the World Bank because my interest really is in development economics," she says. "But I talked to various people who worked for these agencies and I realised that, although they are wonderful, very worthy organisations, I couldn't thrive in an environment like that, not after years in the City. But we wanted to do something with a developmental objective."

Convinced of the virtue of "trade not aid", their objective was to establish a venture that would "enable sustainable growth in developing countries" in which they could do business. ("We believe in the profit motive," she says, "as a reality check and for sanity.") "We said we would try to create jobs in these countries. We'd try to see what they have in the way of their own materials and skills and we'd try to foster them and combine them with our skills, which are essentially technological and scientific, to take them to a different level in the market."

In essence, then, their business plan was to find a way of turning what might otherwise be buried in landfill into something saleable and very expensive, and in so doing encourage traditional skills going back centuries, while simultaneously developing new laminates, lacquers and substrates necessary not merely to meet International Maritime Organisation regulations, but surpass them. When it came to flame resistance, for instance, "we're going beyond the gold standard", she says.

It hasn't all been plain sailing. An early attempt to set up a factory in Colombia was aborted when the Farc insurgency made operating there all but impossible. But the company Tan and Hoeve have built numbers among its clients brands such as BMW and Porsche, as well as the designers of yachts, private jets and premium residences. More than that, Nature Squared is using waste to create extraordinary materials that speak not just of nature and leading edge design, but integrity, longevity, sustainability, craftsmanship and heritage, all combined to create something one might reasonably consider the apotheosis of luxury.

The man who digs trees

Michael Merritt is a woodworker who creates stunning interiors without having to chop down his beloved raw material

Deep in the swamps of Florida and the bogs of Croatia there lies buried treasure: old growth wood. Not only does it have a richness and character not found in its current growth counterpart, but it's also in sync with a growing environmental consciousness – salvaging it saves a tree.

At the forefront of this movement is Merritt, the Ohio-based company that works with top designers to craft interiors for estates and superyachts. "The aspect of not having to cut down another tree is important to us and we feel the responsibility to share what we know," says Michael Merritt, president of the family business that began with his father, George, an artisan woodworker.

What they know is that coveted woods such as tidewater red cypress can be recovered instead of culled from the one remaining old growth stand. In the 1800s, harvesting the massive 500 to 1,500-year-old trees from Florida's Apalachicola swamps meant floating them out, but the dense wood loaded with cypressene was inclined to sink. Ten per cent of the tens of thousands of felled trees didn't make it. "These are what we are still chasing today – the sinkers," says Merritt. His company uses them for panelling, cabinetry, flooring, ceiling beams and more. "It's a very good wood with an interesting grain. We often wire brush it to create texture."

Even more rare is the pecky variety, peppered with holes caused by a fungus when it was living. Merritt built a saloon for 85 metre *Cakewalk* (now *Aquila*) out of this.

Merritt also recommends reclaimed longleaf pine, forests of which used to cover 90 million acres of the southeastern US until they were exhausted in the 1920s. This highly rot-resistant pine was used in the pre-steel era to build mills and factories. Today, wood from dismantled buildings can have a second life in ultra high end interiors.

For veneers, Merritt turns to Eastern Europe for bog oak, ancient trees that likely met their fate naturally, toppling thousands of years ago in low lying wet areas and discovered only fairly recently. These are all dwindling supplies that Merritt estimates will be depleted within 10 years. "At some point those who have, will have; and those who don't have, won't have."

Words – Kate Lardy

Portrait – Roger Mastroiann

"Not having to cut down another tree is important to us and we feel the responsibility to share what we know"

Above: Keith and Michael Merritt run the woodwork and joinery company founded by their father. It creates custom interiors for luxury residences and yachts such as 85m Cakewalk *(now* Aquila*), top left*

Wood you believe it

Imagine a wooden boat that doesn't need painting, varnishing or sanding and is completely weatherproof and waterproof. Imagine no more

Paul Clegg and I are discussing decks. "It's not just what the weather throws at them, the onslaught of saltwater and extreme radiant heat," says Clegg, CEO of London-based Accsys Technologies. "It's also that someone has to clean them every day and, if you are power hosing something or washing it down, then you are going to have water ingress, and when water gets into the smallest joints and the tiniest cracks and they are vulnerable to movement, then you have a problem."

In patenting a process that essentially turns softwood into super-durable hardwood, his company, however, has come up with a type of wood, Accoya, that is "impervious to the effects of water", not to mention longer lasting, more environmentally responsible and "much, much lower maintenance" than teak. Your crew will also thank you for the fact that it splinters much less than other kinds of wood, and its low thermal gain means it doesn't get hot underfoot.

Developed a little over a decade ago and produced in the Netherlands, Accoya (it rhymes with sequoia, the giant Californian redwood that is highly resistant to decay) has gradually been gaining champions in the construction industry, and has been used for everything from the façades of the Louis Vuitton store in Cancún and a Copenhagen sports stadium to the doors designed by the modish architects 6a for the photographer Jürgen Teller's studio and a floating jetty on Amsterdam's Eastern Docklands. And its proven durability when immersed in water means it is now gaining traction as a material for use in boatbuilding, too. Indeed, the Dutch boatbuilder Roelof van der Werff has constructed his 6.1 metre electric dinghy Werffboat 21 almost entirely in Accoya.

Inevitably, Clegg was an early adopter. "I've got a speedboat with an Accoya deck, quarter-sawn American alder, which gives it a nice grain feature, and I've left it outside unoiled, untreated, unvarnished for three years now to see how it reacts, and there isn't any movement at all. On top of that, there's been no UV degradation either. You'll often see that decks are ridged because the UV degrades what's called the growth wood, the wood in between the growth grains. People wash it down and sand it to try and smooth it out, but after six or seven years you might have to replace the deck, which is an expensive process."

Accoya, which is usually made from radiata pines grown in sustainably managed plantations in Chile and New Zealand, has also been used for spines in the reconstruction of traditional wooden hulls ("it allows for traditional joinery techniques, but doesn't suffer problems of movement, which can be an issue in the spines and the ribs of an old boat," says Clegg), as well as the substrate in epoxy hulls. ("If you get a crack in an epoxy hull, you get water ingress, then the water damage to the substrate becomes a big issue to resolve. If you don't suffer any damage from the water ingress, then you have a far cheaper repair job if it's just the epoxy that has to be fixed.")

Given its hardness, there is also potential to use it for masts. For, as Clegg points out, the first known experiments with wood stabilisation were by ship builders. ▸

Words – Claire Wrathall / Portrait – Tomo Brejc

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Above: a bench high in the Bernese Alps in Switzerland. Below: part of the Stavanger Boardwalk in Norway. Both are made from Accoya, virtually rot-proof modified wood

Historically, masts were made from entire tree trunks, "cleaved of all their branches and some were left to soak in peat bogs to improve stability". This may also account for the ninth century Viking long ships that have mostly been found almost perfectly preserved in peat bogs.

Known as acetylation, the process by which Accoya is produced is in some ways a highly sophisticated refinement of the tradition whereby children toughen chestnuts by soaking them in vinegar and either boiling or baking them.

About three per cent of wood is made up of chemicals known as acetyls, Clegg explains. "What we do is boost that proportion by putting the wood in a pressured environment and using heat, time and vacuum to put acetic anhydride, which is a vinegar-type material, into the wood." This causes a reaction that boosts the number of acetyls in the cell walls of the wood, permanently modifying it and changing the way it deals with water by preventing it from penetrating the cell walls. "So water can no longer swell or shrink the wood, therefore no longer importing microbes, which might cause rot. In addition, the process means there's no food value left in the wood so it's no longer attractive to insects." All of which makes it "virtually rot-proof". If you've ever wondered, he adds, why discarded cigarette filters you see dropped in the street don't break down, "it's because they're made out of acetylated wood pulp". ■