A REPORT WORTH READING

The Superyacht Refit Report

185
04/2018

BUSINESS

"Normally, the client will come to us and say, 'We would like to do some work,' and then it takes a century to get a list back. Then you get mixed lists, and that's a worst-case scenario."

Alberto Perrone Da Zara, director yacht services, Lürssen

TECHNOLOGY

Armour chameleon

TSR heads to the shooting range to look at bullet-proof superstructures, with alarming results.

DESIGN

The conversion of Falcon Lair, *and the business case for buying and refitting instead of building.*

BUYER

How much truth is there to accusations of kickbacks and bribes within the refit process?

FLEET

€3,273,000

Average value of a 50-70m refit project

OPERATIONS

Captain Mannie Avenia, M/Y *Lady Duvera III*, on major refit projects

"It's a bit like when you go to the bank and they say, 'We'll give you a new TV', but in reality you are paying for that TV."

Armour chameleon

WORDS AND IMAGES BY TIM THOMAS

Can a superyacht's hull or superstructure stop a speeding bullet and keep an owner, their family and their guests safe? And what are the options if a client wants to armour their yacht for peace of mind without cladding it in steel plate? The Superyacht Report *grabbed a bowl of fruit and went to investigate.*

Let me start by making something clear – I have nothing against fruit. The decision, then, to draw a face on a melon and put it firmly in the firing line was based more on nervous self-preservation than any particular malice towards the honeydew that beamed back at me with a maniacal grin. Here, deep in the bowels of an old railway tunnel in the sleepy market town of Devizes, UK, I was about to get a very graphic demonstration of why you should never believe what you see in the movies.

It's an age-old cliché – the bad guys open fire, the good guys hide behind car doors, upturned tables, refrigerator doors or whatever else seemingly solid comes to mind; the bad guys spray bullets but the good guys are protected and all is well with the world. However, the reality, as my former melon friend will attest, is slightly different.

I had come to Wiltshire Ballistic Services, a world-leading test and certification centre for armour, with UK-based armour specialists Air Sea Land Group (ASL) which wanted to set the record straight. It was not about playing on fears or advancing paranoia, but rather to expose the misconception that metal equals safety. Imagine, they said, if you were on board your superyacht and you were caught up in an incident that could pose risk to you or your family. You might be fooled into thinking that you are safe in your superstructure, protected from assailants by the solid metal walls and panelling and everything else that makes up a modern superyacht. Think again.

Our test was simple. We would fire a standard 7.62mm round of ammunition (the most common bullet in the world as it comes out of the AK47 assault rifle) from 10 metres away at a 7mm-thick mild steel plate to see what happened. Wiltshire Ballistics' Ben, an affable chap with a disarming smile, carefully weighed out the charge and made up the round that would be fired from a specially mounted barrel triggered by computer. A warning siren sounded, followed by a loud pop through our ear protectors. We ambled down to where my melon friend had been hiding just behind the mounted plate – 'had' being the operative word. The melon had been vaporised, its maniacal grin wiped clean and spread across the back wall of the range. In the steel plate was a near-perfect round hole. It had barely even slowed down the bullet.

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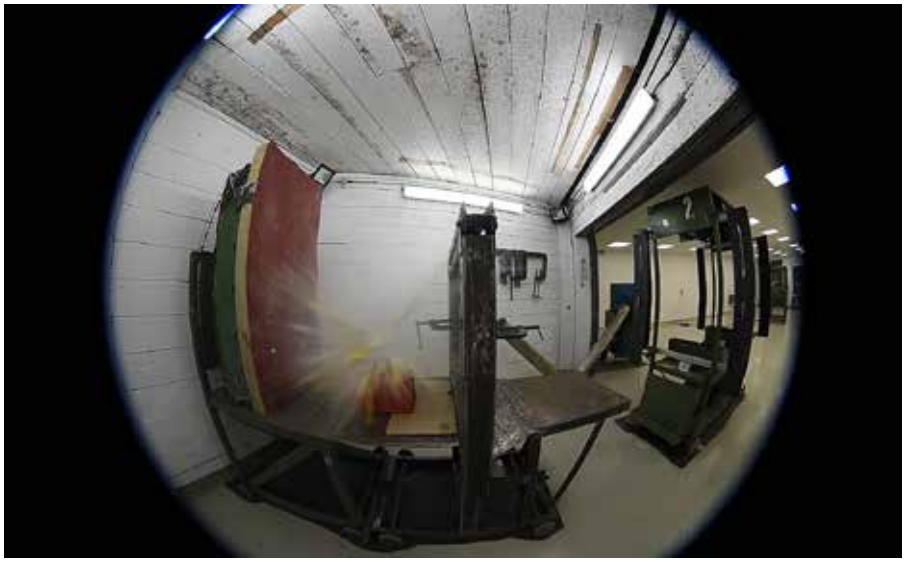

Our test firing at Wiltshire Ballistic Services was a clear demonstration of the lack of protection a 7mm-thick mild steel plate offers against a 7.62mm AK47 round.

“We’re working on solutions using transparent ceramics for use where threats are very high and payload and weight are very important.”

“The test is great to show how the steel put up no resistance to the bullet at all,” says Jonathon Diffey, ASL’s founder and managing director. “There’s a very plain hole straight through, and that bullet would quite happily have passed through all the layers of a yacht structure – the outer skin, aircon ducts, wooden interior finishes – and would have ended up where it shouldn’t.” Diffey is quick to point out that this is not about scare tactics, but about reality. Many superyacht owners take the protection and safety of themselves and their families very seriously, but for those who want additional safeguards it is important to realise that what you think is going to protect you probably won’t.

It is here that ASL comes to the fore. As a specialist armour company with decades of combined experience in ballistic protection, it creates bespoke solutions to cater to the vast and varied requirements of their clients. Those clients range from the military to police forces worldwide, from high-street banks and office buildings to private residences, vehicles and, increasingly, superyachts. The key to ASL’s success is in the way they approach the design and manufacture process.

“Historically, the industry has always been about flat-panel armour systems,” explains Diffey. “One of our unique selling points is that we are able to mould the armour systems into shapes.” With a background in composites and pattern-making, Diffey has built up an expert workforce with a diverse range of similar skills. The result is that rather than just using flat materials or metal sheets to clad what needs to be protected, ASL can mould its protection to virtually any shape and for any space imaginable. This includes replacing vehicle parts and panels with ballistic protection panels that look completely original or, as in the case of a recent project, integrating their aramids into the lay-up of a GRP boat hull to create a series of bullet-resistant 11m power catamarans.

At the centre of their offering is a series of high-tech materials based on aramids and Kevlar mat. ASL do offer standard steel protection but in most cases those solutions are both impractical and far too heavy. “We try to offer two or three different materials to suit anyone’s weight-to-budget requirement and also to suit the specific application,” says Jack Sandiford-Haigh, ASL’s sales director. “As with everything, lighter weight means more expensive, but whereas steel suitable for stopping an AK47 round would be around 48kg per square metre, the equivalent in Legion Polyethylene – when moulded and pressed according to our inhouse-developed processes – is 18kg per square metre. We specialise in these lightweight composite armours.”

To demonstrate the effectiveness of these bespoke materials, we revisit the Wiltshire Ballistic Services range and this time place a panel of ASL’s Legion Polyethylene material behind the steel plate. Three further rounds are fired into the steel in a triangular pattern – the standard test pattern to meet the internationally recognised BR6 certification for armour designed to stop 7.62mm rounds. The results are impressive – the ASL panel is deformed but the bullets and all fragments are safely encapsulated within the laminated sheets. My melon would have survived unscathed, no doubt with an even wider insane grin on its face.

“The problem with [ballistic armour] steel is that you will often get a ricochet – the bullet will stop dead, but you’ll get fragments coming off, whereas a composite like our Legion Polyethylene is designed to delaminate, naturally slowing the round down and capturing it,” says Sandiford-Haigh. “The material also floats – it’s a similar density to water – and it’s also very good at deadening sound and vibration, especially when compared to steel armour.”

For yacht projects, ASL works in a couple of ways depending on whether the yacht is a new-build or looking to add protection during a refit, or whether it is simply adding a system to an existing space, a process known as up-armouring. “Ultimately, within the superyacht environment, our armour is not on display – it’s hidden behind the façade and interior fit-out,” says Diffey. Typically, if integrated from the start, the armour panels would be mounted between the steel or aluminium outer skin and the inner finish – the only requirement really is for an air gap (technically called a stand-off) of 25mm to allow space for the material to delaminate and capture the bullets and fragments. “We can also create panels with a very nice room finish if required,” adds Diffey. “In an ideal world, it’s always nice to be there at step one in the design stage so that the naval architects and designers can take into account the weights and strains we need for our armour systems and also to create the room itself.” This is also important because to give an area true ballistic protection, it’s not just about adding armour to the side walls. As the range test demonstrated, a round of ammunition can pierce several layers of metal and

ASL's lightweight Legion Polyethylene armour not only captured a series of 7.62mm rounds but also prevented any fragments from escaping. The deformation is down to the delamination of the material layers, a specific design feature that dissipates the kinetic energy and ensures nothing gets through the barrier.

other obstacles, so both the floor and the deckhead have to be taken into account to cover opportunistic angled shots that could come from above or below – for example, from the quayside or a harbour wall when in port.

The implication from this is that it is very difficult to make an entire vessel bulletproof – particularly on the scale of a superyacht – therefore the more common route is to create an armoured space to where the owner and his family or guests can retreat in the event of an attack in order to remain secure until help arrives. This could be the entire master suite, a bathroom or a similar space.

"We're selling bespoke items and we're trying to capture the imagination of the customer about what can be done," says Diffey. "We don't work from a set rule book because everyone and every situation is different. For example, you could have a walk-in wardrobe within a dressing area, and even if the yacht is already built, if you want protection there we can do it. We just need 25mm of space within it to line the wardrobe or wherever it may be, and we can even finish the armour system to an aesthetically pleasing finish or with panelling or veneer. There are many different things we can do. Our materials also don't have to be right next to, or close to, the ship's hull or superstructure skin. As long as we have the small air gap, it's irrelevant where they go."

Of course, armouring a part of a superyacht superstructure only makes sense if any relevant glass windows also match the ballistic protection of the skin. Specialist glass is required for this, but here the weight penalties can be more severe – for now, at least. "The ballistic performance of transparent armour really

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revolves around hardness and mass to stop an incoming projectile,” says Bill O’Gara, CEO of ballistic glass manufacturer Isoclima. “Simply speaking, you have multiple layers of glass bonded together by an inner layer, and there’s often a polycarbonate backing as a catcher’s net to stop any glass fragments coming out the back.”

Currently, thicknesses of glass vary depending on the threat level – in other words, the type of round the glass is designed to stop – but they range from 22mm for handguns up to 80mm for armour-piercing rounds. It is obvious glass that thick comes with a considerable weight penalty, but advances in technology could soon change that.

“You’re going to see more chemically toughened glass which can give different types of glass composition and hardness which will allow us to get thinner and lighter glass for the same level of ballistic protection,” O’Gara continues. “But on the military side, you are going to see transparent ceramics become more commonplace – we’re working on solutions using transparent ceramics where threats are very high and payload and weight are very important.” This new technology comes with inherent levels of complexity to develop the entire system. There is still work to be done but O’Gara says it is very close to being commercialised.

If this is initially being developed for deployment within the military sphere, it is not hard to see the potential trickle-down to other sectors, and this also opens the door not only for easier implementation on superyachts but also, potentially, on tenders. It is this potential that ties in nicely with projects ASL is already developing with boatbuilders and superyacht tender specialists, and a tour around its facility on the Isle of Wight shows just how this could be brought to fruition. Among the diverse projects the company is currently working on – including supplying 150 custom-moulded, blast-resistant composite armour plates designed to bolt on to the bottom of a police department’s cars – is a series of six customised catamarans being built for a Middle Eastern client.

For this, ASL is employing its tool-making and moulding skills to the max, taking the existing standard 11m cat moulds and adapting them to allow for ASL’s lay-up process incorporating its aramid armour plates. “Any composite lay-up usually has a core material to give it strength and reduce the weight,” adds Diffey. “We’ve got the ability to remove that core material and put in an armour material which gives the same stiffness but also the ballistic protection without taking up any extra space. We use a different mat – a ballistic-grade fabric – but we also use a laminated core of our existing armour system. The result is, as with everything we do, it’s designed to look OEM.”

This, really, is the key. It’s all about bespoke solutions and low-profile armouring. For example, if ASL is called in to up-armour an existing space on a superyacht, they will arrive in an unmarked van, often at a quiet time of day or night, and no one will know that armouring has been fitted and hidden somewhere within the vessel. “We also take into account what it’s being used for, where it is, if it’s going to be subjected to heat or solar energy etc.,” concludes Diffey. “It’s a very bespoke sale and we don’t sell anything off-the-shelf. We’re not drawing from a catalogue of standard parts or armour plates; rather we’re selling the capability of what our materials and our technology can do.”

As I clean the last of the grinning melon fragments off my camera, I can’t help but feel that all this would have been good to know before that first test shot was fired.