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# The Superyacht

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# REPORT

## **SUPERYACHT INDUSTRIALISTS**

*TSR* speaks to MTN Communications' managing director and recently elected ISS president Derik Wagner.

## **TURNING TANKOIA AROUND**

Following a tumultuous history, Tankoia shipyard is back on its feet after two recent sales.

## **LIGHTING UP YOUR LIFE**

A look at what there is on offer and the latest developments in the underwater lighting world.

## **GROWING A BACKBONE**

The importance of future-proofing AV technology on board in order to stay up to date.

Contributor  
Comment

# The two faces of aluminium



PHOTO: © REISSI

Aluminium corrosion regularly exasperates owners and shipbuilders. **Kay Wrede** of Wrede Consulting writes about this construction material that is perfect in principle, but actually reacts very sensitively when treated incorrectly.

Aluminium is widely regarded as a miracle material when it comes to building superyachts. It is light, robust and easy to process. For structures above the waterline, it seems shipbuilders struggle to imagine a world without it. Its strength-to-weight ratio is three times greater than that of steel and comparable structures can be up to 60 per cent lighter. Aluminium's ability to protect itself is well known, as it reacts with oxygen to form an oxide layer. Yet that is one of the two main problems with this material. If aluminium is to be coated, any oxidation must first be removed from the surface completely, which – in our experience – requires a working environment that is hard to achieve in normal shipbuilding operations. Aluminium can only be processed with tools that do not come into contact with steel or rust, and steel shavings – from grinding or drilling – must be completely removed. Furthermore, blasting sand and compressed air must be free from grease and other contaminants in order to guarantee that the coat adheres evenly.

Regrettably, when dealing with aluminium parts, the corrosion under the coating only becomes visible months or years later and can often no longer be linked to unclean processing. The burden of renovation then falls on the owner, who in turn has to rely on the shipyard performing the renovations scrupulously and preparing it before a new oxide layer forms. This is a labour-intensive and expensive process, but it is one that has a positive long-term effect on the maintenance of the yacht. Certainly, it is possible to achieve success on the face of it at a lower cost in the short term, but the corrosion will then continue to spread unchecked beneath the surface and, sooner or later, it will break through the coating. The colours applied are permeable to water

vapour and under the coating, oxygen is lacking for the controlled layer of oxidation to form on the surface.

As consultants and surveyors, we are permanently fighting against this ignorance in processing. Only a few owner representatives, shipyards and colour manufacturers are aware of aluminium's sensitivity during processing. Often, they don't want to see the problem – particularly as a processing error can generally not be proven after the coating and will become apparent only months or years later. We therefore recommend sandblasting in any

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case as a preparation for the coating for both refits and new constructions. Around 90 per cent of the subsequent damages are found in areas that have simply been sanded – and, in some cases, the filler on entire decks can later be removed in one piece.

Aeroplane construction has shown that effective surface pre-treatment is possible. Although an A380 is comparatively small (73m), at some €400 million it is expensive in comparison to a superyacht. However, the aluminium plates are pre-treated in special acid baths for their short service life of around 25 years. For this reason, refitting on the same scale is not as common as in yacht building.

The second problem with aluminium is its position in the periodic table. It is low down in the electrochemical series, between manganese and magnesium, and relinquishes its electrons to almost all other materials in the presence of an electrolyte such as seawater. This means that it dissolves galvanically and accumulates on the 'nobler' surface. This process is difficult to stop if the processing and insulation of metals is not carefully considered when building or renovating yachts.

The connection between the hull and superstructure has shown itself to be a key point for our work. In the 1950s and 1960s, simple stainless-steel bolts were used for the connection between the aluminium and steel, while today triclad strips are used for

The sheer number of shipyards and processors means that rigid quality control can often not be considered a given and procedures must be adapted to the characteristics of each individual construction. At Wrede Consulting we therefore use our own proven quality standard, which considers the ISO and International Marine Certification Institute (IMCI) recommendations and combines them with our practical experiences. Our recommendations are tailored to the respective substrate and the desired coating, as well as the surrounding environment and the processor's capabilities. Seamless supervision is the key to success. A night shift that thoughtlessly cleans a surface with a cloth is enough to undo all other efforts.

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this. Both foreign materials are combined according to a patented process and used as an adapter between the steel and aluminium for simple welding. Here too, corrosion and pitting is evident after a while – the periodic table will not be outsmarted.

So what can we do? For customers with ships that have already been built and are facing corrosion problems, we recommend renovation with scrupulous adherence to all of the specifications for separating the two materials. This includes covering sensitive areas, checking whether oxides or salts were actually completely removed from the surface during the treatment, using separate tools and applying the coating under carefully defined external conditions. That is the only way of effectively containing aluminium corrosion, subject to regular checks.

For new builds, as stated, equally meticulous material handling is necessary. For example, this starts with the rule that even slightly corroded plates must not be used or that the connection between the hull and the superstructure is carefully insulated, for example, according to the current practice in aeroplane construction where safety concerns have led to stringently defined and applied procedures.

In several cases, we advise against using aluminium because it is so sensitive. It is worth thinking about using prefabricated GRP sandwich superstructures, which require almost no maintenance and can be stuck to the more cost-effective and stable steel hulls. That way, the difficulties described above can be circumvented in the long term. Today, subcontractors can produce very large GRP parts in almost any shape without problems. They also weigh even less than aluminium and the sandwich construction provides effective insulation.

For many shipyards that work with metals, however, that is still tantamount to an insult, as it requires the will to work with a completely new substance. However, from our point of view, it is the right way to go in the future. It alleviates the fears of potential owners regarding the risk of incalculable subsequent costs – in this area at least. ■



TO COMMENT ON THIS ARTICLE,  
EMAIL: [ISSUE164@SUPERYACHTREPORT.COM](mailto:ISSUE164@SUPERYACHTREPORT.COM)  
WITH SUBJECT: THE TWO FACES OF ALUMINIUM

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