advantage

Gurit

The Magazine of SP-High Modulus, the Marine Business of Gurit

2012/13 issue

Q5 Catamaran - The Big Cat
World Superyacht Awards Success
SP-High Modulus Product Update

SP Gurit™ HIGH MODULUS™

I would like to welcome you to this latest edition of Advantage, the magazine of SP-High Modulus, the marine business of Gurit. This is also my first edition of Advantage as General Manager Marine, so I hope that you find it interesting and informative.

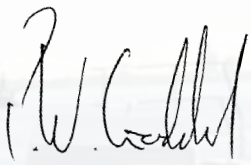
I think this edition illustrates some of the wide range of projects where our composite materials and engineering expertise have been used to great effect.

As a full service composites provider we can offer a complete service to boat builders and designers and we continue to grow in many areas of the marine market. One such area is military applications and the article on the GARC water craft, a small manoeuvrable rescue craft for military applications, shows just how our composite materials can benefit all types of marine craft. We also feature an article on commercial boats with the SWATH SeaStrider, currently in build at Danish Yachts. This innovative project is a maintenance crew transportation craft for use with offshore wind turbines.

Alongside these articles we also have a number of other features including an overview of some recent projects in the Italian market, an update from our engineering team on designing for fatigue in marine structures and a product update article with the latest developments from our technical team.

We are always keen to hear from you so please let us know any feedback using the contact details on the back cover of this issue.

I hope you enjoy this edition of Advantage.



Paul Goddard

General Manager Marine

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ITALIAN MARKET OVERVIEW

SP-High Modulus has continued to strengthen its involvement with the Italian marine market with a range of exciting new projects incorporating both materials and engineering.

COMAR YACHTS – COMET 100RS

The Comet 100rs was the first Maxi Yacht to be produced by Comar Yachts at their Fiumicino shipyard in Italy. Comar have a long history of designing and building performance yachts that are also practical, enabling them to be used for everyday cruising. For the Comet 100rs project Comar put together a team of specialists to create both the Maxi 100rs and 85rs. Their composites expert Antonio Latini and structural designer Giulio Ricci were joined by designers Andrea Vallicelli and Alessandro Nazareth to bring the project to life. SP-High Modulus' Italian distributor Resintex also joined the team and supplied materials for the build.

The lines of the hull and deck are designed as those of a fast cruiser. The yacht offers limited displacement but ample interior space. The design is optimised to offer maximum comfort even when racing. The 100rs shares the same waterlines that had been developed for the previous Comet 62rs and Comet 52rs in that it is a performance hull with the polished elegance of the deck saloon and eagle-eye windows. There are two cockpits on the stern, divided by a large sun deck, the first for manoeuvring and the second for guests. A creative solution was also found for the tender, housed in a dedicated dinghy garage in the stern. The tender can be quickly launched thanks to a vertical mechanism that can lift a 4 metre tender with an outboard engine.

The hull structure is a carbon sandwich with a Corecell™ M-Foam core. Corecell™ M-Foam was chosen as it provides a combination of high performance and low density which is ideal for hulls. The structure was laminated using SP-High Modulus' Ampreg 21 laminating system. Ampreg 21 is the latest generation of laminating systems from SP-High Modulus and its low initial mixed viscosity makes it suitable for wetting out heavyweight fibres and fabrics.

The combination of both Ampreg 21 and Corecell™ M-Foam ensured that the structure was both strong and light. Alongside these a number of products from SP-High Modulus' adhesives range were used with the fibreglass laminates. These included Spabond 368 (for use with wooden strip planking), Spabond 340 (hulls and large structures), Spabond 5-minute (small jobs), Spabond 345 (use on uneven surfaces) and Spabond 370 (ideal for bonding teak decks). All materials were supplied by SP-High Modulus' Italian distributor Resintex, who are based in Frosinone.

The Comet 100rs features a drop keel with a maximum draft of 4.8 metres and a minimum of 2.7 metres enabling the yacht to have access to shallow moorings. The keel can be raised or lowered quickly allowing the owner to use the yacht in a variety of situations.

The yacht was launched to great acclaim at the Genoa Boat Show. Laura Fabi from Resintex commented "We are pleased to have been able to supply SP-High Modulus composite materials to this new Comar Yacht. The finished yacht looks very elegant and we look forward to working with Comar on their future projects".

FLYING DUTCHMAN DINGHY

SP-High Modulus supported Planatech (a composite builder based in Rome) on this high tech Flying Dutchman (FD) class dinghy project, supplying both materials and structural engineering services. Alongside this, in order to guarantee consistent quality and weight throughout production, a B^3 SmartPac™ kitting solution was developed for the materials. The design and building process for this dinghy followed similar techniques to those normally associated with large high-performance racing yachts. A preliminary structural study was carried out to evaluate the best material choice and structural weight distribution. The materials selected for the build included SP-High Modulus' ST 70 SPRINT®, SE 70 carbon prepreg, Corecell™ M-Foam in different densities and thicknesses and Spabond 340LV structural adhesive. Once the basic laminate and weight estimate were complete, the focus was on the finite elements optimisation of the forepeak area. The output of this study allowed the optimum layout to ensure the maximum stiffness of the forepeak and therefore a mast drop under rig loads that is much smaller than usually measured in a FD dinghy. The first model was launched in July 2012 and more are expected, as this high-tech take on a traditional yacht class takes to the water.

REVOLVER 42

A further project that SP-High Modulus' Italian distributor Resintex have been involved with is the Revolver 42 project. The Revolver 42 (or R42) is a monohull speedboat, built by the Italian shipyard Anselmo Mauri, that is capable of reaching speeds of up to 68 knots. The design was a joint effort between US based Michael Peters Yacht Design and Milan based H30.

Through Resintex, SP-High Modulus supplied Corecell™ M-Foam to the construction of the R42. Corecell™ M-Foam was chosen for the infused hull and deck sandwich construction because of its high strength and low density and resin absorption. These attributes also mean that the laminate weight is lower and therefore the overall structure weight is reduced. The Corecell™ M-Foam was supplied with a double cut configuration meaning it could be easily placed in the mould and ensuring that there were no build ups of resin in sections of the mould.

The R42 is now on the water and attracting attention at various boat shows around Europe including the Monaco Yacht Show.

SP-HIGH MODULUS DISCOVERS NEW 57

SP-High Modulus has provided engineering services and materials for the new Discovery 57, the largest resin-infused sailing yacht to be built in the UK from Hampshire-based Discovery Yachts Ltd.

The Discovery 57 is built at Discovery Yachts Marchwood yard and is due to be showcased at the 2012 Southampton Boat Show. When launched it will be the largest resin-infused sailing yacht built in the UK. Designed by Ron Holland with an interior design of Ken Frievokh, the Discovery 57 is a blue water short-handed cruising yacht designed for performance, but equipped to a high standard to give a luxurious finish.

SP-High Modulus' engineering team worked closely with Discovery Yachts in-house design team on the structure of the new yacht. The scale of this work included providing a complete drawing and engineering package for the boat's composite structure. High end finite element programs were used to design a carbon mainsheet structure resulting in a light and stiff structure. It allowed Discovery Yachts to maximize the impression of space in the aft cabin by raising the headliner and installing large bonded windows in the aft deck face. The structure was also engineered so that it does not rely on internal joinery for strength and stiffness giving Discovery Yachts the ability to adapt the accommodation of the yacht to suit individual clients' requirements.

SP-High Modulus' UK distributor Marineware supplied Corecell™ M-Foam and Spabond 540 adhesive for the construction. SP-High Modulus has worked with Discovery Yachts for all previous projects including the 55, the Cat 50 and the Discovery 67.

"We were very pleased to supply materials and engineering to the build of the new 57 and look forward to seeing her on the water at the Southampton Boat Show 2012" Alex Shimell, SP-High Modulus

Success for SP-High Modulus at the World Superyacht Awards 2012, Istanbul

Two superyachts that featured SP-High Modulus' materials and engineering were awarded prizes at the 2012 World Superyacht Awards in Istanbul. The owners, designers and project management teams of Hetairos and Antares III both collected prizes at the prestigious event.

Hetairos is a 66m ketch, built by Baltic Yachts in 2011. It was the recipient of the judges' special award for a 'Notable contribution to the technical advancement of sailing superyachts'.

Hetairos is the largest yacht produced by Baltic and its hull is believed to be the largest single prepreg moulding ever built. SP-High Modulus supplied both materials and engineering to the build of Hetairos. Along with SP-High Modulus, the Hetairos project team was made up of Dykstra and Partners (Naval Architects), Reichel Pugh Yacht Design (Designers), Rhoades Young (Interior Design) with Jens Cornelsen GmbH managing the project.

Antares III is a 30m cruising sloop designed by Dixon Yacht Design and built by Yachting Developments in New Zealand. SP-High Modulus' New Zealand engineering team worked closely with the builders on the project ensuring that the boat is 25-30% lighter than comparable vessels made from aluminium. Antares III won best sailing yacht in the 30m-40m size range.

TASMAN OCEAN CHALLENGE

According to the Ocean Rowing Society there have been approximately 300 successful crossings of oceans since 1896 by craft propelled using oars. More people have conquered Mount Everest than crossed oceans using oar-power.

The Tasman Sea in between New Zealand and Australia was first crossed by a rowing vessel in 1977. However no one has yet rowed the Tasman Sea from New Zealand to Australia and back again before. This is what ocean rower Danny Sunkel hopes to achieve in early 2013.

The motivation behind it was to raise money for Cancer Research, a cause that was close to Danny's heart having sadly lost family members to the disease.

The boat that Danny will use to attempt the challenge has been built by Tauranga based Pachoud Motor Yachts. The original brief for the design was for the boat to be strong, safe and able to self-right along with being stylish and fast.

SP-High Modulus was approached to supply composite materials for the build. The range of products supplied included dry woven cloth, Ampreg 22 laminating resin and laminating consumables, Corecell™ M-Foam, P-Foam and T-Foam, along with Spabond 368 which was used for the bonding of the core materials.

The boat is now on the water and all at SP-High Modulus wish Danny the best of luck on this challenge.

THE BIG CAT

The 100ft (30 metre) Q5 catamaran, better known as 'Quintessential' was designed by Warwick Yacht Design, built by Auckland based yard Yachting Developments and launched in 2012. The catamaran is thought to be one of the largest composite cruising catamarans in the world and was a long term project for SP-High Modulus' New Zealand based team, incorporating both materials and engineering expertise.

Tony Stanton, SP-High Modulus' Asia Pacific Engineering Manager describes some of the engineering challenges the team encountered during this project:

"The vessel was designed to Germanischer Lloyd Large Yacht rule and is maintained in full class. Being a sailing catamaran the owner had a specific desire to create a vessel that was as light as practical without resorting to exotic construction.

To meet this objective, a full cored composite solution was developed using E-glass with significant carbon fibre reinforcing. The desire to reduce weight led the design engineers down the path of using Finite Element Analysis (FEA) extensively in the design. In particular FEA was used on the global bulkheads to create a light and stiff platform capable of carrying the immense loads from the rig of this vessel.

To make the most of the catamaran configuration, the design features an enormous full beam saloon aft of the mast bulkhead. With limited space between the head liner and the cabin top, an elaborate arrangement of beams and frames was required. The arrangement was also required to work around extensive glazing and large skylights, as well as a significant amount of equipment for the yacht's systems which is concealed behind the headliner. In itself this is a fairly common design problem in a large superyacht, but the nearly 11m transverse span on this vessel is what sets this project apart."

To increase efficiency during the build process and assist in future maintenance, the vessel's structural design features large 'soft patches' located on the inside topsides of both hulls allowing direct engine room access during construction and for ease of long term maintenance.

The boat has successfully completed sea trials and the proud owner now intends to cruise different parts of the world with his family, making the most of this spectacular yacht.

DREAMING OF SPEED

Two years ago Vlad Mournikov approached SP-High Modulus, with plans of a radical sailing yacht, aiming to be faster than all sailing monohulls built to date.

Vlad called on SP-High Modulus' composite structural design experience to assist in the development of the layout and preliminary laminate design for a 100ft version, but to get there with such a radical design, a comprehensive programme of R&D, alongside prototyping, has been carried out by Vlad's SpeedDream™ team.

SpeedDream27, a 27ft prototype under construction in the USA, boasts many of the new design concepts to be tested for the full scale vessel, including:

- Delta-shaped hull, almost triangular in plan view, with a very narrow, wave-piercing bow to reduce resistance and improve seaworthiness;
- An innovative stepped hull that separates speed-robbing drag into two smaller regions;
- Very high stability and sail carrying capacity due to an innovative flying keel that ultimately comes out of the water to provide maximum righting moment while completely eliminating drag.

SP-High Modulus is contributing with engineering and Corecell™ M-Foam and SE70 prepreg.

SP-High Modulus Engineer, Garry Jolliffe commented "The SpeedDream27 has been an exciting challenge. With tight clearance tolerances around the central structural core that houses the support structure for the canting keel system and mast base, a number of innovative solutions were required. Outside of this region the structural layout and laminates were optimised ensuring the final solution meets Vlad's displacement requirements."

INTRODUCING THE G.A.R.C

The Greenough Advanced Rescue Craft (G.A.R.C), a small, unique craft with a multitude of possible applications, is now in production at Hodgdon Defense Composites (HDC) in Maine, US. The George Greenough concept has been developed and prototyped by Rapid Response Technology since 2005, culminating in new tooling and a cost effective construction specification developed by SP-High Modulus, and supplied in a B³ SmartPac™ format from its US facility.

The jet powered 3.6m vessel is capable of speeds of up to 40 knots, can travel in severe conditions, with a max payload of four people, making it ideal for rescue missions, whether from the beach or dropped from a plane in open ocean. The cathedral hull and beam offers a very stable yet manoeuvrable platform with potential for leisure applications.

HDC now have over twenty G.A.R.C's on order and have rapidly established a production capability under the leadership of Gregor Welpton. To meet the requirements for a robust yet lightweight structure, capable of repeat production with a new team, HDC turned to SP-High Modulus, with whom they had worked previously on other military craft. The engineering team developed a set of laminates exceeding ISO requirements, and commensurate with the end use – saving life in challenging conditions. The hull is infused epoxy, utilising relatively heavy double bias and unbalanced 0/90 multiaxial E-glass reinforcements but with an aramid option in the bottom shell, on a Soric core. The deck and internals, also infused epoxy, are stiffened with 10mm G-PET 110 foam core, and are bonded to the hull with Spabond 340. The complete laminate is infused directly onto a polyester gelcoat, without a hand laid skin coat, significantly reducing labour and cycle time.

From the outset the engineering was developed to suit a B³ SmartPac™, as Welpton had opted for this CNC cut package of reinforcements and core to improve production times, insure a quality build, and lower overall costs, based on his previous experience with the system. From a late November 2011 project meeting, the laminates were designed, test panels made, and the B³ SmartPac™ developed through to delivery of the first hull in late January 2012. In the three B³

SmartPac™'s (hull, deck, and internal structure) there are over 600 individual pieces. With over fifty straightforward assembly drawings and instructions these can be loaded in the mouldings in less than 12 man hours per hull and 15 man hours per deck. According to Welpton "The SmartPac™ greatly reduces our composites build time and production costs; it beats the labour time required for the cutting and kitting of each vessel by hand, and also means that we do not need a dedicated area of our floor plan to serve as a cutting room. Further, the shop is not cluttered with off-cut waste. The packaged kits arrive as we need them, go into the moulds quickly and efficiently as they were designed to and actually keep the labour force happier throughout production because of the clean shop."

On 3rd July at a formal launching, after taking the G.A.R.C for a test ride, the guest of honour, Senator Susan Collins proclaimed "That was so cool. Let me tell you, the [U.S. Navy] Seals are going to love this thing." This was following her speech during which noted, "In these challenging times, it is imperative that America's Special Forces be able to operate effectively, quickly and safely in the most difficult of conditions." Initial contracts are with the U.S. Air Force Special Command and the Air National Guard, and now that production is accelerating with the B³ SmartPac™, the market is expected to grow rapidly.

ADASTRA – The Cruiser

"One of the world's most amazing superyachts…" was how Boat International magazine described Adastra, the striking 42.5m trimaran launched from McConaghy Boats' Zhuhai Facility in China. Initially she reminds you of Cable & Wireless and Earthrace, power trimarans with which SP-High Modulus has also been involved; but Adastra is far from a stripped out record-breaking machine.

John Shuttleworth Yacht Designs and McConaghy Boats turned this concept into a viable luxury yacht to meet the needs of a very experienced ocean voyaging family. A key objective of the Adastra project was to keep fuel consumption low.

To achieve the balance of requirements, advanced composite materials from SP-High Modulus were chosen throughout the vessel. The hull shell was constructed of a hybrid E-glass/aramid unidirectional fabric and Corecell™ A-Foam sandwich, infused with PRIME™ 20LV resin. Spabond 368 was used for the hull core bonding, with Spabond 340LV used for general bonding; and Ampreg 22 was used for secondary bonding and wet laminating. The demi-hulls were constructed of the same hybrid unidirectional as the principal hull, but with Nomex cores. The deck and superstructure are of carbon construction, with Corecell™ used in the deck and Nomex used in superstructure.

SP-High Modulus has worked closely with McConaghy Boats in Australia and China for many years, with current collaborations in build including the Ker 46 race yacht and MC²60 sailing catamaran, and the recently launched MC38 race yacht.

Companies involved with the project: Naval Architecture, Exterior Styling & Structural Design - John Shuttleworth Yacht Designs Ltd, Interior Design - Jepsen Design, Builders - McConaghy Boats

FATIGUE IN MARINE STRUCTURES

Fatigue failure occurs under cyclic loading at a stress below the static material strength. Metal fatigue is now a well-known phenomenon and it is a central part of the design process for machinery, but boats also see cyclic loading from slamming and propulsion, and sailing boats have highly variable loads from the ballast keel and the rig. Why then is fatigue not a central part in composite boat design? The possible reasons for this are:

- The design budget is lower and duration is shorter, requiring a simpler process
- Lack of accurate load data for fatigue analysis
- Not many boats spend enough time at sea to accumulate sufficient fatigue damage on the hull structure. Rigs and rigging do fail in fatigue, due to lower design safety factors associated with importance of weight and the lesser consequences of failure
- The approach taken seems to have worked well so far

A successful track record is a real-life verification of the design process. Historically boat design has been evolutionary, but science has facilitated the major developments.

The fatigue performance of a material is defined by an S-N curve, where S is the stress amplitude and N the number of cycles to cause failure, but this makes obtaining one for each material time-consuming and expensive. Aluminium has a finite fatigue life, but other materials such as mild steel, provided stress is always kept below a certain limit, can go on indefinitely.

For an S-N curve with a slope "m" the relationship is:

$$S = k.N^{\frac{1}{m}}$$

So higher values of m provide a longer fatigue life.

A wind turbine is highly optimised for energy efficiency and the design time is considerable compared with a boat structure. Furthermore, load cases are more easily determined and monitored, enabling a thorough consideration of the fatigue performance of the blade.

Due to self-weight alone, as the blade turns around the clock the strain in some parts will go in a complete cycle, both positive and negative. The frequency of the cycle will depend on the speed at which the turbine rotates.

Germanischer Lloyd (GL) has detailed rules, including fatigue consideration for composite blades, and define a partial safety factor.

$$C_{1b} = N^{\frac{1}{m}}$$

Material	m	C_{1b} Applied partial safety factor (for assumed 10^7 cycles)
Glass Polyester	9	5.99
Glass Epoxy	10	5.01
Carbon epoxy	14	3.16
Metals	5	25.12

So when designing the structure, materials that are better in fatigue (such as carbon epoxy) have a lower safety factor applied.

As a consequence, for such cost sensitive components, the blade spars are generally epoxy (prepreg or infusion depending on the manufacturer). Even if the initial cost is greater, the through life costs are less as they have a longer life.

Generally m values for cores are higher than for laminates, but lower for adhesives.

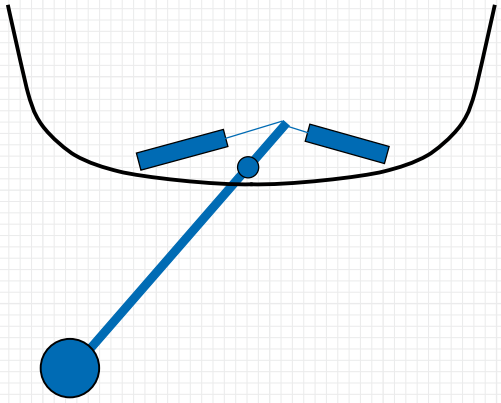
The load spectra can be broken down into a set of stress ranges around a mean stress, arranged in a "Markov" matrix. From this it is possible to estimate the percentage of life used by each bin of the matrix.

This however is time-consuming, so a simpler alternative of calculating a Damage Equivalent Load (DEL) can be employed:

$$S_0 = \left(\frac{\Sigma_i n_i s_i^m}{N_{eq}}\right)^{\frac{1}{m}}$$

(S_o can be stress, strain, force, moment etc.)

Applying this to a hypothetical IMOCA 60 canting keel structure, we can assume the cycles and percentage of material strength as follows:



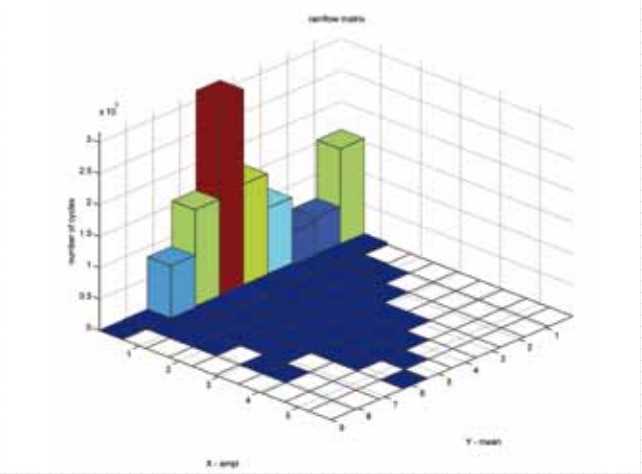
m	14		
n_i	6.00E+05	3.00E+05	1.00E+04
s_i	0.2%	0.1%	0.4%
$n_i s_i^m$	9.83E-33	3E-37	2.68E-30
n_{eq}	8.00E+06		
s_o	0.25%		

$$S_0 = \left(\frac{6e^5 \text{x } 0.002^{14} + 3e^5 \text{ x } 0.001^{14} + 1e^4 \text{ x } 0.004^{14}}{4 \text{ x } 2e^6} \right)^{\frac{1}{14}}$$

This can be compared with the appropriate stress from the SN curve for N = 8e6 (4 x 2e6) cycles to see if there is sufficient margin.

We also recorded keel ram pressure, from which we can derive keel loads.

To disseminate the trace into cycles, a process called "rainflow counting" is employed, which gives the distribution of cycles below.



The tall columns represent the large number of low amplitude cycles, whereas the more extreme loads occur fewer times the shallow "tiles" to the right hand side.

Assuming carbon, steel and adhesive parts of the structure are designed equally for the IMOCA rule minimum safety factor of 5.

Using m values for carbon, adhesive and steel of 14, 8 and 5 respectively, we can determine the Damage Equivalent Load (DEL) for each material, from the sum of each column to give:

$$\sum n_i s_i^m$$

The assumed lifetime number of cycles is 1 x 107, which represents approximately 9 times the number of cycles recorded, or 3-4 round the world races.

m		RF Ult	DEL s_o	% strength at N_{eq} cycles	RF Fatigue
14	Carbon	2.78	6.8%	34.1%	5.05
8	Adhesive	2.78	3.7%	15.2%	4.15
5	Steel	2.78	2.0%	4.9%	2.48

The static margin for all components is the same (as the initial assumption). Under fatigue, carbon has a greater margin but less for the steel parts, so it becomes fatigue critical.

Although the structure will not fail in fatigue during the assumed life of the boat, some parts are fatigue critical in their design. It follows that many boats do several round the world races, but keels tend to be replaced.

The above is a somewhat hypothetical consideration of the keel ram attachment design for fatigue, albeit with real loads, to show what can be done. So why is this not done as a matter of routine? Aside from time and budget limitations, what we are dealing with here is a one-off design. A new boat designed for a race several years later will differ, and so will the conditions. The uncertainty of the sea conditions and the likely course taken are much harder to predict than the load conditions for a wind or tidal turbine.

However, just because something is difficult is no reason not to try. We have fitted data acquisition equipment to racing boats and can make a general summary of the loads seen; already this feedback has proven useful. In addition, superyachts are now being fitted with custom built permanent systems.

Note pre-stressing of rig points (such as mast compression) means that the variation in load is small, making risk of fatigue failure less significant for such parts. The matrix of information that can be gathered from boats can be used for reviewing static and fatigue strength.

As is often the case with composites, what is relatively simple and understood is more complex and unknown. However the knowledge database is increasing and Gurit's engineers benefit from cross-fertilisation of ideas from different industries.

STRIDING THE WAVES

Due to be launched at the end of 2012 the SeaStrider SWATH (Small Waterplane Area Twin Hull) project from Danish Yachts is an innovative solution for crew transport vessels.

SWATH boats differ from traditional catamarans in that its twin hulls are submerged thereby reducing the impact of the waves. In addition the vessel offers a dual mode principle where it can operate in a catamaran mode, or switch to having its hulls submerged when the conditions become rough. This design also provides a stable platform and large, broad decks which are ideal for working and commercial craft. The design also enables a relatively small vessel to be as stable as a much larger vessel.

Danish Yachts were commissioned to produce a series of SWATH-design boats to be delivered to the Norwegian ship owner Fredrik Odfjell, between the end of 2012 and mid 2013. The boats, named SeaStrider, are designed to transport construction and maintenance teams to offshore wind farms.

The designers of SeaStrider had a number of key specifications that needed to be incorporated in the construction of the craft. This included the ability to dock at a wind turbine in difficult sea conditions, easy to lift and store, easy to maintain and of a robust construction. In order for these specifications to be achieved, two 'firsts' needed to be incorporated into the construction. One was an 'active ballast system' which is used to aid stability in difficult sea conditions. The second innovation was to build the craft using carbon fibre.

Danish Yachts has a long history of using carbon fibre in their previous boats and the decision was made to use it in the SeaStrider project due to the light yet strong properties. The lightness meant that the vessel would use less fuel, meaning a reduced environmental impact and also smaller fuel tanks giving more room for passengers and cargo. The strength of carbon fibre meant that the vessel would have a long working life and require minimal maintenance, increasing the 'on-water' time.

A variety of materials from SP-High Modulus' advanced composite materials range were supplied to the build of SeaStrider to meet the strong yet light ethos. This included PRIME™ 20LV, an epoxy infusion system which is ideal for use with large structures such a yacht hulls.

SP-High Modulus also supplied its B³ SmartPac™ to the build. The pre-cut pieces of Corecell™ M-Foam were incorporated in the construction of the bow thruster, water ballast intakes and engine cooler intake. B³ SmartPac™'s were also used in the underwater hulls and the decks. The benefits of using the B³ SmartPac™ solution means that the core materials arrived packed in boxes in the order that they needed to be used for the build. This approach saves both time and costs in the construction process.

Piet Heydorn, SP-High Modulus' Technical Sales Manager Yacht and Shipbuilding Northern Europe commented, "Composites are usually associated with high performance racing yachts or superyachts. However the SeaStrider project shows that the benefits that composites bring to boat construction are applicable to all types of marine vessels. SP-High Modulus worked closely with Danish Yachts on the materials supply, composite processing and the composite engineering for the SeaStrider. We like to ensure that we support our customers throughout the entire build process and are able to offer the full range of services to them whenever they are required."

Kristoffer Jensen, COO of Danish Yachts explains, "We are using the skills and experiences learned from a number of high performance superyachts in carbon, in a completely new area, skills that we have built in partnership with SP-High Modulus. This exciting project is the first of its kind, and is only made possible through a very intense operational co-operation, where the tailoring of the technical solutions, the training and on-site advice and coaching goes much further than a normal supplier relationship".

SP-High Modulus Product Update

Gurit has recently been working on a number of improvement projects affecting the SP-High Modulus product range. If you have any feedback regarding these changes please feel free to contact SP-High Modulus on marine@gurit.com.

NEW LLOYDS REGISTER CERTIFICATIONS

Gurit has recently achieved Lloyds Register certification for the following products:

- PRIME™ 20LV
- SA80 with Nomex
- M-Foam

Copies of certificates are available should you require them.

PREPREG 'ESSENTIALS'

Based on feedback from the market, Gurit has developed a range of prepreg 'Essentials'. These are nine key prepregs, that are held in stock and are available for marine customers, shortening lead times and offering more competitive pricing.

FORMULATED PRODUCTS PACKAGING

With immediate effect, Gurit will be phasing in new plastic packaging for formulated products. This replaces the metal packaging that was no longer proving to be a consistent and reliable solution.

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