PRESS RELEASE
For immediate release

Olympic Class Racing Catamaran Hulls Designed Stiffer and Lighter Using a 'Carbon Free' GMS Epoxy Prepreg, S-Glass, Honeycomb Sandwich Design

The legendry Olympic Games Tornado class multihull was selected by the International Yacht Racing Union (IYRU, now ISAF) for the first ever Catamaran open event in the 1976 Olympics in Canada up until the last appearance in the Beijing 2008 Games in Qingdao, China, before multihull sailing was taken out of the Olympic program. The Tornado is still recognized by ISAF (International Sailing Federation) and is competitively raced all around the world annually at both regional and world championships. It remains one of the fastest double handed small (20ft / 6.1m long) catamarans, characterized by some in the multihull racing world as the "the Formula One of sailing"; top class sailors have been able to reach speeds approaching 30 knots (almost 60 km/hr) on a reach, the fastest point of sail.

Carbon free hull regulations

Unusually for a competition racing boat of this type, the Tornado class catamaran maintains echoes of its 1966 design heritage, originally produced with epoxy fiberglass sheathed 'tortured ply' wood construction hulls. Today, the International Tornado Association (ITA) still does not allow the use of any carbon fibre materials in its hull build regulations. As a result, the Australian multihull specialist, Windrush Yachts, manufactures all of its Tornado hulls with a GRP sandwich laminate design, moulded out of autoclave (OoA) at low temperature (~100 ^{0}C/ 212 ^{0}F) using GMS EP-270 epoxy prepreg and an S-glass cloth multilayer combination, with a Nomex® aramid paper honeycomb core; the use of a honeycomb core also helps to provide buoyancy that enhances speed. Windrush Yachts has manufactured Tornado FRP sandwich hulls since 2007 at its production facilities in Perth, Western Australia. Surprisingly, this carbon exclusion rule was retained even after the official ITA sail specifications were significantly increased in 2000, with the addition of a new 25.00 sq. m (269 sq. ft) spinnaker sail, as well as increasing the area of the existing jib and mainsail up to 21.94 sq. m (236 sq. ft). In contrast, for the boat's rigging with its 9.08 m (29.8 ft) mast, the use of carbon is permitted by the ITA, and so rigs are now almost exclusively manufactured using carbon fibre reinforced high performance composites.

Solving design challenges

This significant increase in sail power has created particular design challenges for leading boat builders of new Tornados, including Windrush Yachts. The 'carbon free' epoxy based composite hull and deck structure needs to be stiff enough to take the immense forces (mainly inwards at the bow) that the large rig exerts, yet still provide the high speed 'slam' impact resistance and flexural bending demands placed on a hull when racing. An added engineering challenge is the fact that a single hull has to be able to handle all of these forces alone since, whenever possible, the Tornado 'flies' with one hull typically out of the water to minimize drag resistance. Selected after a number of comparative trials and mechanical testing, the epoxy prepreg specified is a variant of the standard GMS EP-270 grade, custom produced by GMS Composites Pty Ltd. with the specific flow and tack properties Windrush Yachts need to consistently achieve the desired OoA vacuum moulded laminate properties and finished part quality. The custom made GMS EP-270 prepreg provided the best combination of high

performance dynamic strength properties with the thinnest, lowest weight, outer laminate possible. It also provided shop floor production benefits including: its ease of use and handling properties, being able to position the prepreg accurately even into tight mould corners; a shorter ramp up and dwell time, with a lower cure temperature; and a long shelf life. Another major benefit to Windrush Yachts is on the supply side, as the bespoke GMS-EP270 prepreg is supplied to order in small batch quantities as needed, and within a comparatively short lead time. GMS Composites Pty Ltd. is also an Australian company, located in Dandenong South, Victoria. Its extensive production facility has a variety of different prepreg product lines, manufacturing to order for prototype developments and small volume batches, as well as higher volume production orders. GMS Composites has particular expertise in developing and supplying custom designed BMI and epoxy prepreg solutions for both moulded parts and robust tooling, not just for the marine market, but also for demanding applications in Aerospace (including MRO tooling), Ballistics and Defence, Automotive and Motorsport.

Stiffer and Lighter GRP Honeycomb Epoxy System

Brett Burvill, is a director of Windrush Yachts and a world class Tornado racing skipper, who ranked No. 2 in the 2014 Tornado Worlds leader board at the end of last year's racing season. His passion for Tornado racing is matched with a strong desire to make top class boats, commenting: *"When Windrush Yachts was first awarded a Tornado class construction licence by ISA , our aim right from the start was to make our boat hulls perform as well, if not better, than the existing class leading hulls built in Europe. This was not only to win races, but also to offer greater durability so hulls would last longer, which we knew customers wanted."* The Windrush team has been able to maximize the strength and stiffness modulus required, while at the same time reducing overall hull weight despite not being able to turn to carbon fibres. Burvill explained how they have been able to do this: "W*e have found that the best combination is to use GMS Composites EP-270 epoxy prepreg, which we reinforce using a 200 gram +- 45 deg S glass in combination with a heavily unbalanced 300gm glass cloth that together effectively produces an unbalanced Quad for the outer skin laminates, with a 12mm thick Nomex sandwich core for maximum stiffness, shear modulus and deformation resistance."* The complete finished weight of each 6.10m long (20ft) hull, which is only 405 mm at its widest beam point, is around 38kg (84 lbs), giving a combined twin hull weight of a Windrush Tornado of just 76kg (168 lbs) of the complete sailing craft weight, fully rigged at 155kg (330 lbs). Burvill went on to say: *"Along with a careful laminate layout, this combination of materials for the sandwich structure gives us the very high stiffness needed in the hull, especially longitudinally, yet still provides excellent damage tolerance with a hard, but tough, outer surface which feels reassuringly durable to our customers."*

Windrush Yachts specializes in the marine sector, and uses its composites expertise not only for sailing boat hulls but for producing lightweight FRP foils, centerboards, cross bars and tillers. It also uses its knowledge and production capabilities to manufacture high performance composite parts for motorsports, defence, mining, industrial and recreation applications. More details about Windrush Yachts can be found on line at www.windrushyachts.com.au.

For more information about full range of moulding and tooling resin systems and custom prepreg design services provided by GMS Composites Pty Ltd., go to www.gmscomposites.com.

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Websites featured in this article www.gmscomposites.com www.windrushyachts.com.au

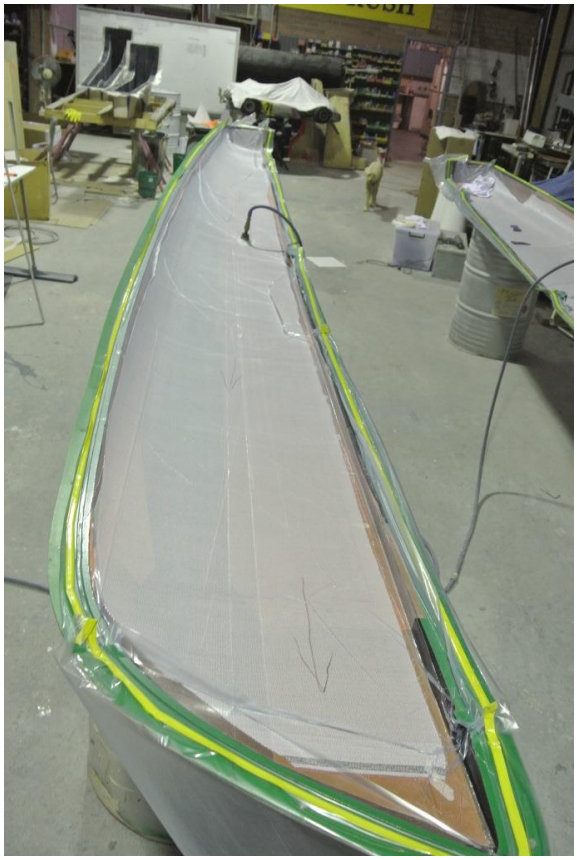
Photos & Captions:

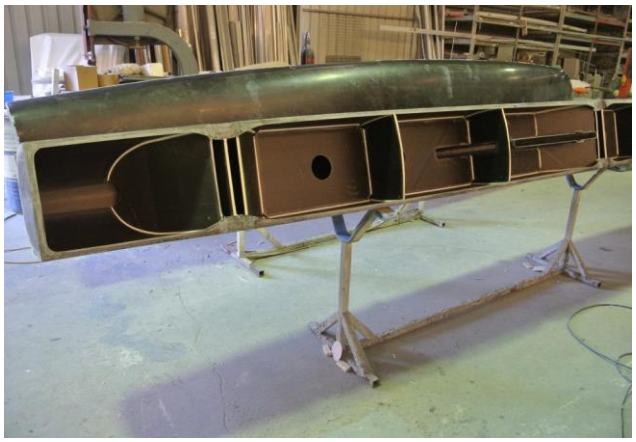
Photo 1: Windrush Tornado catamaran racing

Photo 1 (a), (b) and (c) caption:

The legendry, former Olympic Games Tornado multihull, still regarded by some as the "the Formula One of sailing", is able to reach speeds approaching 30 knots (almost 60 km/hr).

Photo 2 (a), (b), (c) and (d): Windrush Yachts Tornado catamaran hull under construction





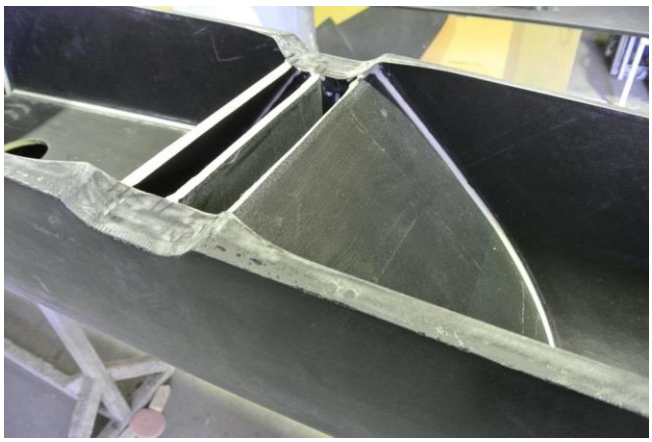


Photo 2 (a), (b), (c) and (d) caption: Using a customised GMS EP-270 epoxy prepreg with an S-glass cloth multilayer combination, provided Windrush Yachts with the best high performance dynamic strength properties, and thinnest, lowest weight, GRP outer laminate possible for its Tornado catamaran honeycomb sandwich composite hull design, according to ISAF build design restrictions.

Photo 3: Windrush Yachts Tornado catamaran hull and deck moulded sections

Photo 3 caption: The 'carbon free' epoxy based composite hull and deck structure needs to be stiff enough to take the immense sail rig forces, yet still provide the high speed 'slam' impact resistance and flexural bending demands placed on a single hull when racing.

About GMS Composites

GMS Composites is located in the Melbourne suburb of Dandenong South, Victoria, Australia, where they have their R & D, production and warehousing operations. GMS Composites has been manufacturing epoxy prepregs for over 12 years and now have an established range of over 10 different prepregs resins systems, which cover a wide range of industries including: aerospace, defence, ballistics, rail, motorsport, automotive and tooling. GMS Composites also provide CNC machining services and distributes nationally across Australia a wide range of vacuum consumables, reinforcement fabrics, cores and mould release agents from leading global ancillary and reinforcement suppliers.

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