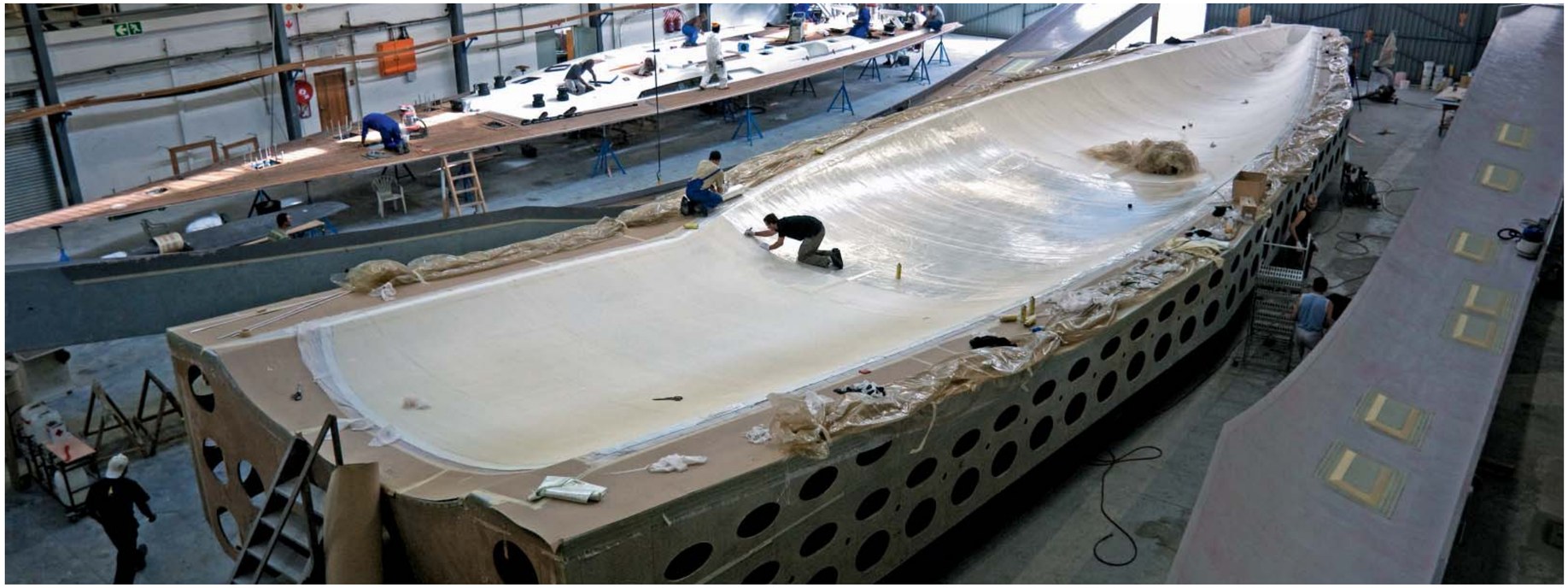
Southern Triplets

IN SOUTHERN COMFORT



TYR's Italian Editor Justin Ratcliffe was invited to visit the Southern Wind Shipyard in Cape Town in March. With 30 yachts on the water ranging in size from 72 to 100 feet, the Italian-owned company has emerged as a stiff competitor to the high-end builders such as Nautor's Swan and Baltic, since Willy Persico set up the shipyard in the early '90s. With production up to at least two hulls a year under strong Italian management, man hours on the shop floor have increased from 60,000 when the shipyard opened for business to the current figure of over 300,000. About to augment its production space with a new 2,200-m^2 construction shed, SWS also have a 94-ft performance sloop in the pipeline. Designed by Reichel-Pugh, this racing-oriented yacht (*yet another bucket boat! Ed*) is in response to client demand and production of the first hull is expected to begin in October.

During Justin's visit to the yard he was intrigued to see the hull moulds of another new model – the SWS 110-footer. Advanced composites (carbon fibre, Kevlar, epoxy resin and Corecell/Klegcell) infused in a female mould is fairly "normal", what was unusual about the 110-footer, though, is that the hull is being built in three longitudinal sections instead of being split down the centreline. To find out more he talked to Stefan Falcon, head of the composite and lamination department. Stefan graduated in Yacht & Boat Design at the Southampton Institute of Higher Education in 1987 and previously devoted much of his time to supervising the construction of composite racers, such as Giovanni Soldini's Open 50', the Open 50' Wind and, with the Illbruck team, the Volvo 60' and the German America's Cup yacht.

TYR: *Can you explain the infusion method you use?*
Stefan: We started infusing big laminates with the 100-ft mainly because I did not want to be limited by the 'open time' of a resin hardener. I could only have laminated so many square metres in the maximum eight hours available to me and generally it is a bit of a rush job that tends to get a little bit 'sticky', or messy to say the least. With infusion we can use smaller teams to lay the dry fibres; they can take as long as they need to position all the fibres precisely, and only when everything is in place, is the bag closed and the vacuum pulled. Up to the very last minute when you mix the resin, the whole operation can be postponed, aborted or slowed down. This is becoming increasingly important for a work environment that is closer to industry standards than to a small boatyard. If everything is not 100% in order – and I can take my time to check everything, lay-up, piping bag leaks, etc – we do not mix the resin.

Once everything is in order and we mix the few hundred kilos of resin, we are committed for two hours maximum and it becomes more of a supervision task than an active laminating task. If the groundwork is done properly, we should have no surprises, which is not the same with a wet lay-up. The fibre-to-resin ratio is better with infusion: the chances of a laminate aerating are less, void content is minimal, no fibres get wasted and resin wastage is also minimised. We lay all the fibres of the outer skin in the female mould, we lay peel ply and release film on top of the laminate and cover the lot with an infusion mesh. Over the mesh we lay a resin feed system made out of various diameter pipes and a vacuum system made of more pipes around the whole perimeter. When we pull the vacuum in the bag (a similar concept to wet lay-up, pre-pregs, etc.), the vacuum that gets created in the cavities in between the fibres sucks the resin in when we open the feeds. Vacuum and capillary forces between the fibres is what wets out the whole laminate.

We then bond the core in the traditional way, when the outside skin is hard and debagged. After bonding and after the core surface has been prepared, we lay the inside skin fibres onto it and repeat the infusion sequence once more. The reason we have a mould split on the centreline for the 100-footers is that we find it easier to work on an almost horizontal surface rather than trying to stick the dry fibres up the topsides in an upright configuration. Also the pressure differential between the highest and lowest point in the laminate is reduced, and on such big laminates it could make a difference of hours to complete the infusion.

TYR: *Why the decision to build the 110-ft hull in three longitudinal sections?*
Stefan: When I had to decide how to build the 110 mould I wanted to make it easier to work in the toerail. In this boat the laminate is more complex and people need to spend more time there laying fibres and using machinery. A centreline split mould would have given me a huge height for the resin to climb all the way to the top if I was to lay the moulds on their sides at 90 degrees. I played around with the idea for a while and when I received the core layout drawing I realised that we had different thicknesses of core throughout the boat. The thickness transition was close to where I would have liked to split the infusions anyway, so I decided to try and split the mould in three parts. I'm lucky in that Willy Persico, the owner of the boatyard, does not put

many restrictions on my R&D programme, and he gave me the opportunity to try this route. Like all things, there are advantages and disadvantages with a mould configuration in 'three halves': so far the advantages far outweigh the disadvantage of the extra space the moulds take up and the hassle of de-moulding. Would I do it for a yacht smaller than 110 ft? Probably not, I have different ideas for smaller boats, but the hull shape and proportions must always be taken into account.

TYR: *You mentioned R&D; what other new processes are you working on?*

Stefan: Every day that goes by we try to find a better, lighter, quicker way to build things. Sometimes it is a small item, sometimes it is a major breakthrough that cuts down thousands of hours. We do testing, prototyping and mock-ups and when something does not work to our satisfaction, we can the idea. In general, though, I prefer to change one thing at a time, prove its worth and then move on. We rarely introduce more than one improvement at a time, and with bigger projects, the innovation slows down a bit. We work with the whole range of materials, from polyesters to epoxies and pre-pregs; with all fibres, such as glass, Kevlar and carbon. We infuse, do wet lay-ups, vacuum bagging and oven cures for pre-pregs. The important thing is to remember that they are all tools for building different products, and it is up to us to choose the right materials and techniques for each component and our choices are not only performance driven. No material or application technique is intrinsically the best – there are different choices we can make to build the same product in different ways.

Text and photos: Justin Ratcliffe

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