

THE YACHT

report

The leading magazine for the design, construction,
management, ownership & operation of luxury yachts

Issue 106

July/August 2009



Nino Ciriello graduated in mechanical engineering at the University of Palermo in 1999, and obtained a PhD in mechanical engineering in 2004 and a Master's degree in yacht design in 2008. He has been working in various aspects of mechanics, especially in fracture mechanics of composites and innovative experimental stress analysis techniques. As an enthusiastic sailor, he has turned the passion for sailing into scientific investigation focusing on several CFD simulation studies specially pointed on the centreboard platform organisation and downwind sails stream analysis.

"Doyle uses his CFD version and, in addition, the Italian design office strictly cooperates with the Department of Structures Engineering at Palermo University for investigation of sail materials response. The very sophisticated CFD version is useful for University R&D, but in the sail plan design 'the last word' is left to the person who actually designs the sail and his experience. World-known technical engineers said that designing a sail is more complex than designing a supersonic airplane. To analyse a full sail project the quickest and most powerful computer would still need some years. In reality, when designing a sail many simplifications are made, therefore the designer experience becomes crucial."

Nino Ciriello, Doyle Italy R&D staff chief, is convinced that we still have big improvement margins in the engineering of construction details and finishing details: "I would reply in two

parts: what can we do better in the near future and in the longer term:

In the near future I feel the need for a stronger sail engineering, doing many more resistance trials (for example: load, brake, chafe, weather condition resistance) on materials, on each component, and on each construction detail. I see improvement possibilities through engineering dimensions of materials. Until yesterday the sail production was still done by human experience and without parameters determined by engineering methods."

"In the longer term we know that computer power and speed will increase vertiginously. I think, and hope, that CFD will become more utilisable in the next few years. Improved sail aerodynamic performances and structural aspects with, for instance, innovative yarn disposition are being studied by the most important sailmaker groups in the world. Doyle is of course between them, but research direction and results are obviously kept secret."

Is there a difference in longevity of today's sails – can we do better?

There is a relevant difference in the longevity of today's sails for two reasons:

1. New materials;
2. Much better constructive details.

The new Doyle Stratis sails are more durable than the triradial spectra sails and are performing as racing sails, since Doyle invented and patented an innovative technology to laminate the sails at a very high pressure, correctly orienting the yarns along the load path.

So, in Stratis sails the external pressure used during the bonding process is as strong as in the material used for triradial sails, but the yarns are better oriented along the sail load path. All yarns converge to the high load point in the corners of the sail, not only under normal sailing conditions but also those new clew and tack corners that are generated when a sail is reefed. Stratis new technology prolongs the sail life.

Regarding new materials, the passage from Triradial sails to Stratis membrane is an epoch marked as strongly as the transition from cotton to Dacron and from Dacron to high modulus fibres.

Regarding constructive details from past experience and empiric tests (which were mostly used), today the analysis of constructive and finishing details is run with engineered parameters. Therefore all details are lighter, stronger and easier to use.

Do you anticipate a growth in the percentage of the superyacht fleet that are sailing yachts?

In 2009 we received more requests and closed more sail orders than in 2008. We see that there are a good number of sailing superyachts under construction. We think that the extra work we are getting is mostly due to the greater interest of project managers and captains for our Stratis product and not a growth of sailing yachts compared with the motoryacht, so in reality it is an increased market share.

Sailing Stories

ENGINEERS' COMMENTS



With the introduction of below-deck line-handling solutions using electric and hydraulic captive winches, large sailing vessels can now run with much smaller crews. Being able to remove all the ropes and tails below deck you have super clean work areas and greater aesthetics. With less crew you save space, running costs and have greater flexibility in interior design. With fewer hands, though, there is a downside: the vessel is possibly more vulnerable with the now-out-of-sight and boxed-in winches. Maintenance is more critical. As an engineer you cannot casually see any problems develop. Apart from the routine maintenance of the winch itself, cleaning and lubricating the external parts are much needed. Make sure the power pack is well maintained too and change the oil more regularly, rather than on the fixed number of hours, say 250–500; go for regular oil analysis. Change the oil filters based on measured pressure differential before and after the filter. Never run too hot so you damage the seals, hose and degrade the oil either, for example VG22 Oil operates up to 35 degrees C and VG 68 up to 65 degrees C; running at higher temperatures greatly increases oxidation and the build-up of contaminants and sludge. As the oil is the major component lubricating and transferring the power, which is directly affected by the oil viscosity, it's important to understand you are running your system with the right viscosity for the climate you're in. The wrong viscosity affects lubrication and power consumption to do the required work. Always run the system to operating temperature to allow total lubrication before applying significant loads. Also always ask: is there a hand or auxiliary powered option? After all, you wouldn't want a jammed main halyard with a storm on the horizon.

Joe Hodgson

In 2000, we crossed from Portugal to Antigua on a 33m sloop launched at end of 1999. When I came on board I noticed that everything (from lights through to the grey tank) was controlled on the yacht's computer, and I wasn't feeling very confident about this. (I respect electronics; however, I have a limited belief in them.) There was an alarm for everything on this yacht... apart from the one most important thing. Here comes the story... we were about 1,000 miles from the Caribbean when we received news from the Internet that we could expect a lot of wind, so we decided to reduce the main sail, which was furling into the boom. That should be OK, however, for the hydraulics to work we needed the engine on. The owner tried three times to start the engine with no result and so sent the captain to the

engine room. Sea water had come in through the escape up to the injectors of the engine. We couldn't use the engine!! It took two days to find a way to reduce the main sail by hand. Thank god there wasn't a hurricane coming towards us! After that the wind dropped and we couldn't put the sail back up, as by hand it was impossible. The engineer from the shipyard who came on board to resolve some problems in Portugal said the yard was going to build more yachts with this system (computer and hydraulics). My question to him was: "Is there a way for each thing to be done by hand? Just in case?" He said, "Yes." But, as we noticed this is not very easy, and not always possible. When we arrived in Antigua, the owner was very disappointed to have to change a brand-new engine and asked

me: "What do you think about all this?" I told him: "I don't understand why there are alarms for everything on board (if you didn't hear an alarm for more than half an hour you started to think that something must be wrong) and yet there wasn't one for when sea water was coming into the engine? An engine that you need for using the hydraulics... It just doesn't make sense!" I have to add that we didn't have bad weather or any unusual waves in the Atlantic: I had another experience with sea water coming into the engine through the escape of a classic yacht built in 1937 and after a storm where the waves were confused, which I can understand. That happens...but on a brand new prototype! What do the people who build the yachts think about?

Anonymous

In a time where the industry is feeling the pinch, the more owners we look after in regards to running costs, then the more jobs there will be in the industry!

As the night was falling we dropped anchor in the bay of A, the water was flat as a mirror, and with everybody so tired after the last charter the captain did the shift for the night and we all went to bed. The plan was to sleep there overnight and to be in port B early in the morning.

Dancing on the early night waves the yacht was wrapping her chain around a rock – as we found out later. After an hour or two of going to bed I heard and felt a severe noise just few metres from my head. When we all went to see what it was we saw that a metre from the chain was dropped and the chain locker was bent in an effort to hold the chain, which was as tight as a guitar string. Then when the next wave came we all felt how the bow was bending from the power of the water.

It took us seven hours to cut the locker, to pick up the anchor with the other winch and to secure the broken one. The damage was amazing. The barrel was 'split' like a banana and the bolts of the base were so bent that I had to cut them to take them out. We headed to port B during the early morning and we all enjoyed the sunrise after the interesting adventure together.

Ivan Petkov



I worked for some time on a 64m sail yacht and was truly amazed at the lack of forward thinking. The builders were using steel and cast iron housed, unsealed electrical motors completely exposed – firstly to our type of environment and secondly in the direct path of seawater, via the sheet pulley housings. I would imagine that some kind of remote drive source for the same result would improve longevity!

Not only was it the hardware but also the electrical and electronics that were also directly exposed...so as anyone could imagine, the failure rate and maintenance of that equipment as well as the massive unnecessary cost to the owner could definitely be reduced with a small amount of forward thinking, as well as the creative use of some of today's technologies in regards to the materials used!

In a time where the industry is feeling the pinch, the more owners we look after in regards to running costs, then the more jobs there will be in the industry!

Chief Engineer Scotty Angelo

We have just crossed the Atlantic on a 37m sailing yacht and having motored the whole way – more due to weather than choice – we realised you can do 24 Atlantic crossings' worth of diesel with one mainsail! We used approximately 50 litres/hr motoring at 10 knots.
Katherine Bruce, Y4 Marine Engineer

During a two-month filmed television documentary the crew and I found ourselves in a moment of despair. For filming purposes we had been asked to use sail power as much as possible. This classic sailing vessel has not been technically modified so all sails are controlled manually by the crew; all hands were needed on deck when informed that the lower part of the main sail had been ripped from tack to clew.

The hole, caused from fatigue, meant that the heavy boom was no longer held stiff as the sail was not catching the wind. If the boom was not controlled it would have swung out and removed the shrouds, which help support the mast to the yacht. To lose the mast would have been an absolute disaster.

This did not happen, as we literally pulled together and reefed the sail to the boom, with the holed part of the sail no-longer subject to the wind, so that the intact part of the sail could continue to function normally. On arrival of our next port of call we sent the sail ashore for repair.

Anonymous

Specification is the most important – and having someone at the yard to represent the owner, to make sure they get what the owner is paying for on their yacht. Not only that, but working with the yard through the whole building process is important so that access to the equipment for maintenance and repair is possible after the yacht leaves the yard.

The Shipyard: From what I've seen in France, Germany and Finland these shipyards are always trying short cuts in order to save some money.

The shipyard is always good at picking the owner's specification apart. They are always looking for lower quality equipment so that the yard can make more money. The owner has a budget and the shipyard is always looking for more money, with change orders for less cost.

My personal feeling is at times there been criminal activities going on. The same can be said with capacity of equipment on board; the shipyard is always trying to give out less capacity for this (smaller and less equipment) so they can make more money. At times the owner or inspector does not even know. But in service the owner will feel it. Then it's usually too late. (This is for the capacity of the power, cooling systems, HVAC systems, refrigeration system, tank capacities, fresh water, grey water, black water, bilge etc).

Warranty or Guarantee Process: The owner and yard need to agree on this before signing the contract, that is for one year on labour and parts (and more than one year on larger equipment). The yard and owner should also let all the vendors know about the guarantee rules and costs. If crew on board fix the problems with parts and labour then the yard should be charged; therefore agree an hourly rate. (Make sure travel cost is included in the guarantee process.)

Classification: Work closely with the society so that everything is legal, that is materials, fire protection systems, safety systems and equipment. (Have the crew present with the representative from the classification society when all of the testing of this equipment takes place).

Maintenance and Parts: Make sure all the yard's and vendor's manuals are in the hands of the owner asap, so the owner can sign the contract. Make sure these manuals match what is installed on board. Vendors and the yard are responsible for the training of all crew members and owners for how to use the equipment installed. Get the response time from the vendor. I feel as though my yacht is the only yacht which actually sails everywhere! We even sailed the whole Atlantic Ocean without engines. Everything related to sails is electronically controlled, that is the captive winches and hydraulics. This does cause a few problems – a breaker trips here then a faulty sensor there mean that the process of getting rid of the large rags takes even longer than the already dangerously long ten minutes. Usually the squall passes while we are still putting the sails away!

My engine room has the mizzen mast keel stepped aft, making movement across the engine room difficult for anyone with a bit of a belly. The length of the engine room is the length of the main engines plus a foot at the rear; I therefore have extremely limited access to the front of the engines.

Anonymous

Photos: [Tork Buckley/superyachtart.com](http://TorkBuckley/superyachtart.com), [Caroline Hillier/superyachtart.com](http://CarolineHillier/superyachtart.com), MM/superyachtart.com, [Brooke Shaw/superyachtart.com](http://BrookeShaw/superyachtart.com)

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