

# INVESTING IN PERFORMANCE

## HOW TO MAKE YOUR YACHT FAST AND COMFORTABLE

We hear more and more frequently about performance in the yachting industry.

Usually the word is used to refer to results one can expect to achieve in a competition. But when it comes to luxury sailing superyachts, performance goes beyond optimization for regatta conditions to include the best set up for enjoying the thrill of sailing in total comfort and safety in any weather condition.

Each client approaching the construction of a new yacht has different expectations in terms of performance. It depends how they plan to live their yachts: some are looking for a racer/cruiser hoping for a podium finishes at major regattas and offshore races. Others want a cruiser/racer for fun and comfortable sailing both during family weekends and ocean crossings.

How can a potential owner optimise his or her yacht for the performance that they desire? Can a single yacht model meet the performance targets of different owners? To learn more, we've interviewed four important industry professionals close to SWS. Each one has expertise in a different area, but all have crucial roles in accomplishing the performance targets that different SW96 owners wished to achieve.

### MARK VON DRASHEK

SW96#01 Sorceress Project Manager

*He worked in the yachting industry for over 45 years, and for the past 25 years Mark specialized in performance sailing yachts. He worked as captain in cruising and racing programs in the Caribbean and the East coast of the US. Mark started Finnish Line Sailing Inc in 1984, working on Nautor's Swan and Baltic Yachts, servicing, refitting, commissioning new boats and performing warranty work and support.*

*In the recent years he has been involved has build project management as an owner's representative. To date, 14 large sailing yachts have been completed with him working as project manager including the Baltic Yachts/Frers 107 INUKSHUK, and most recent, the SW96 Sorceress.*

### ANGUS FULLER

SW96#02 Seatius Captain

*Born in UK in 1977, he graduated with a BSc Maritime Studies from Southampton Solent University. Angus flaunts 20 years' experience as a captain on several sailing superyacht, including 5 SWS yachts. He approximately sailed 300,000nm including 29 Transatlantics, one transpacific and one circumnavigation via Cape Horn and the Southern Ocean.*

*In 2015 and 2016 he was build captain on two SW102 which he subsequently sailed as a captain. He recently acted as Build Captain and Owner's representative of SW96 Seatius.*

### PAUL DUMBELL

SWS Technical Project Manager

*Born in London in 1973, he graduated with a BSc in Materials Engineering from the University of Cape Town Paul has worked as a composite boat builder on Open 60's, an Americas cup project, a TP 52 and a Class 40's amongst others and as a consulting engineer on a variety of composite materials related projects.*

*Whilst working as a project engineer in the Netherlands he consulted to top Dutch Superyacht Yards and was involved in a variety of composite material related projects outside the marine sector. He joined SWS in 2009.*

### YANN DABBADIE

Naval Architect and SWS Drawing Office Manager

*Born in France in 1978, with a MSc in naval architecture at Southampton Institute in UK. Yann worked as a mast designer and as a sub-contractor for the Aeronautic industry in France.*

*His relationship with SWS started in 2005 when he joined the design office to work on the first SWS 100.*

*In 2011 Yann joined the Chinese Team for the 34th America's Cup as technical and design manager. After 2 years in Hong Kong, Yann came back to SWS working as a Naval Architect and managing the drawing office.*



# MARK VON DRASHEK

## WEIGHT REDUCTION - CARBON FIBER

The extensive use of carbon fiber throughout the construction of a modern composite boat, along with light weight core materials is essential to reduce weight. Knowing how to work with these materials to maximize their benefits is just as key. Engineering laminate schedules is critical to reap the advantages of these lightweight materials to avoid detrimental bulk.

## HULL DESIGN

Although a client may not have racing near the top of their design brief, if at all, it is quite a benefit to draw on the extensive data base accumulated from large racing yacht designs to create a fast and fun super yacht. These newer hull shapes also have the added cruising benefit of increased interior volume.

## LIFTING KEEL

Lifting keels open up cruising areas that were only available to smaller shallower draught boats.

## SAILS-RIGGING-SAIL HARDWARE

Lighter stronger and more dependable sail hardware like reefing systems, halyard locks, winch systems and even sail materials make it possible to carry larger sail plans so owners can enjoy high performance in the lightest of breezes, or in heavy conditions safely. The majority of these advancements have all trickled down from sailing's "space" program, racing.

# 1.

*Acting as an owner representative, what are in your opinion the main factors that influence the performance of a sailing superyacht?*



# ANGUS FULLER

## HULL DESIGN - APPENDAGES

A well designed hull will have the ability to compensate – or not be affected by – the uneven distribution of weight (for example spares or water toys/ tenders, or extra anchor chain) and not allow it to affect performance or handling. However, I have sailed on identical hulls, where one is well loaded for cruising and the other not and haven't noticed a huge difference, the key thing comes down to hull design

## SAIL PLAN - RIGGING

Of course sail design and sail handling play a significant part.

We opted for straight luffed, furling off wind sails. Whilst we may be compromised on how deep we can sail, the ease and safety of deploying and furling means we use our offwind sails in lighter winds and continue using them higher up the wind range than conventionally hoisted gennakers and spinnakers. The thought of going back to snuffers now just doesn't bear thinking about!

# PAUL DUMBELL & YANN DABBADIE

# 1.

*What are the main factors that influence the performance of a sailing superyacht?*

## YACHT'S SIZE

Obviously, the longer the boat, the faster it can go but to a limit. If it grows too much, it is normally impossible to reap the benefits of the extra size with a normal crew. Aim to a yacht big enough but not too big and you will sail fast.

## SAILS

To generate speed, you obviously need power; so the more sail area you have, the more powerful your "engine" is. However, to carry these sails you want to be stable, this is where righting moment comes in to play, specially going upwind when the wind is pushing the boat sideways. Choose your sail wardrobe according to your sailing program and your crew. Select clever and you will buy well.

## HULL SHAPE

In order to gain righting moment the naval architects play with the shape of the hull (wider is more stable but often creates more drag) and the center of gravity (the lower the better). Make sure the hull's design matches your sailing program and style and go for overall performance.

## WEIGHT POSITIONING

Apart from these well-known factors, there are more subtle ones that can improve performance, for example, concentrating the mass in the middle of the boat will limit the pitching fore and aft when sailing through waves. So concentrating mass will improve the sailing performance but also improves the comfort on board. Do not focus only on displacement but make sure loads are well distributed.

## STIFFNESS

We aim to have stiff boats longitudinally so that when load is applied on the rig, the boat does not flex. A stiffer boat results in a straighter forestay (better sail performance upwind) and a hull that maintains its optimum shape.

There is also the side benefit of always being able to open the doors inside when the boat is loaded! A problem that was often occurred on older boats that were not as stiff as the modern ones.

# 2.

*As a builder, to address owner expectations, in which one would you recommend to invest, in order to achieve a higher level of comfort and safety?*

## OVERALL DISPLACEMENT

Giving priority to reducing overall displacement or maximizing righting moment is trickier. A clear design brief from the client helps in this regard and is something we encourage clients to write into the contractual specification.

As a rule of thumb reducing displacement overall helps downwind performance because a lighter boat has less wetted surface area, less drag and needs less power to move. Whereas increasing righting moment assists upwind performance because it allows carrying more sail area for a similar heel angle.

## RIGGING

Following this logic, investing in the rig package will improve both upwind and downwind performance whilst also improving comfort by reducing pitching. Typical features of a high performance rig package include a high modulus carbon fiber mast, EC6 carbon rigging and carbon forestay foils.

## LIFTING-TELESCOPIC KEEL

A lifting or telescopic keel in cruising will allow access to shallow water without compromising righting moment or for more performance oriented boats to optimize righting moment without increasing overall displacement. A deeper keel also has a higher aspect ratio with less wetted surface area and less drag.

# 3.

*As per your experience, which of them is most cost effective and why?*

We rank all our weight saving options by the cost per kg saved, effect on righting moment and total kilos saved.

## LITHIUM BATTERIES

For example, the change to Lithium Battery System yielded an overall weight saving of more than 1,000kg with a low per kg cost but not a bit impact on righting moment. Lithium batteries have been standard on all our projects for the last 8 years.

## CARBON RIGGING

A high modulus carbon tube is the most cost effective of the rig options for increasing righting moment and reducing weight. The next step, often considered in parallel, would be to upgrade lateral rod rigging to carbon with similar benefits but at a higher cost/kg. Continuing in this direction, a carbon forestay combined with carbon foil has the added benefit of reducing forestay sag for upwind performance but is often seen as less forgiving than a rod forestay with aluminum foils. So this option depends of the philosophy of the project.

For a design brief prioritizing racing we would consider increasing the forestay and backstay loads in order to reduce forestay sag even more, but it is something to be considered at a very early design stage as it affects the entire engineering of the boat.

## PRE PREG AND NOMEX

Performance increases can also be found lower down! Prepreg and nomex honeycomb is a more expensive construction technique but when used for flat panels such as foredeck and side decks, it offers good weight savings at reasonable cost per kg saved. For example, on a SW96, a foredeck/side deck in prepreg/nomex saves 140kg and overall decreases displacement and increases righting moment.

## WEIGHT REDUCTION

I was fortunate to work for experienced owners on this project that clearly understood the advantages of keeping the boat as simple as possible without compromising performance. It is always too easy on large yachts to add too much equipment and too many options that leads to complexity and ultimately more weight. There is no lacking for comfort, esthetic beauty, power (in all aspects) and performance on Sorceress.

## LIFTING KEEL - INTERIOR LAYOUT

The lifting keel offers a significant impact on space in either the saloon or the engine room. On the SWS 96, it is located forward of both of these spaces and completely unnoticeable going forward.

The master stateroom forward design was also a big advantage. This keeps the bow lighter and with the newer beamier aft designs, lends more efficient use of space for the galley and crew spaces aft.

# 2.

*Which of them have been implemented in the SW96 Sorceress/Seatius? Which one brought significant advantages also on the level of comfort of the yacht?*



## LIFTING KEEL

We looked at the pros and cons of a lifting keel and decided to go with this as our draft with the keel up (3.4m) still allows us to get into all the best anchorages, whilst the draft with the keel down (5.5m) helps our sailing performance.

## RIGGING

We opted for EC6 backstay, and standing side rigging to reduce weight aloft, whilst staying with rod and aluminum headstays and foils for reliability. I believe the EC6 was one of the biggest contributors to increased performance and comfort. The performance is reflected in the sailing with less stretch and less weight; and the comfort when at anchor or motoring – reduced weight aloft results in less rolling.

## THE SHIPYARD

I feel one of the most cost effective decisions for Sorceress was the choice of the yard to build her. Choosing a yard like SWS with it's extensive experience in building large hi-tech sailing yachts, with proven performance records was a good call. Besides the impressive build quality and the performance results from all aspects of this project, the added pedigree of SWS will be a benefit in the resale of this yacht; quite some time from now.

# 3.

*As per your experience, which of them is most cost effective and why?*

## REDUCE WEIGHT ALOFT

Ensure forgiving and efficient hull design.

Ensure that the sails you buy can be handled efficiently and safely. If you can't put the sails up due to lack of crew numbers or for fear of handling safely then you are not going to maximise the performance of the yacht and enjoy the sailing!

