



IN BUILD BALTIC 142

SUPERYACHTING IN THE FAST LANE

Foil-assisted cruising is the latest innovation to emerge from Baltic Yachts. We talked to the team behind it to find out how it works

The new Baltic Yachts 142 may not be using the hydrofoils popularised by the America’s Cup, but her 29ft 6in long (9m) horizontal sliding foil employs the same principle of lift to reduce heel and boost speed.

The designers of the Dynamic Stability System (DSS) say it could improve the performance of this super-cruiser by 20 per cent, delivering a sustained 25 knots, not bad for a yacht with a predicted lightship displacement of 140 tonnes.

This is the first time the DSS has been used in superyachting, but its benefits will be used for comfortable, fast long-distance cruising rather than gaining an edge on the racecourse.

All eyes will be on the Baltic 142 when she launches in 2019 and sets off on her first ocean passage. If the DSS does what is predicted, it could become commonplace.

Proven technology

The idea, developed by British naval architect Hugh Welbourn and Gordon Kay of Infiniti Yachts, has certainly proved itself on a smaller scale, reducing heel, increasing speed, damping pitching and adding an unexpected degree of steering control in lively conditions.

Gordon Kay, who was at the helm of the Infiniti 46 with its DSS deployed in almost 40 knots of breeze in last year’s Rolex Middle Sea Race, said: “The boat sat at 28 knots, arrow straight, to the point when I wondered if there was any need for me to drive.”

But can these advantages transfer to a 140-tonner for which speeds in the mid-teens, let alone the 20s, would be considered exceptional? The brains trust behind the project believes they can. These include Baltic Yachts’ head of research and development Roland Kasslin, Farr Yacht Design president Patrick Shaughnessy, BAR Technologies chief technology officer Simon Schofield, Gurit engineering’s Simon Everest, plus Welbourn and Kay. Baltic Yachts’ ability to take on complex engineering challenges and meet them with the latest in lightweight advanced composite building techniques, is well documented.

Foil weighs 1 tonne

As can be seen in the diagram on the following page, the carbon foil, weighing 1 tonne, will sit in a casing

built into the bilge of the yacht just below the waterline and slightly aft of amidships. As it happens it runs directly beneath the owner’s double berth.

When not deployed the tips of the foil will be just visible, but when in use it will protrude a massive 22ft (6.5m) to leeward. It is designed to be deployed at speed at which point some 40 tonnes of lift can be generated pushing the yacht upright with a corresponding increase in speed.

Speeds of 25 knots

Gordon Kay says that a conventionally designed yacht beam reaching in 25 knots of wind would heel to just over 20 degrees, but with the foil working heel would be restricted to just 9 degrees and there’s a consequential increase in boat speed. In 25 knots of wind the Baltic 142 could reach sustained speeds of 25 knots depending on sea conditions.

In addition, any pitching motion can be reduced. So apart from speed, the increase in comfort levels is equally appealing.

Because the foil is able to generate a large proportion of the yacht’s righting moment, displacement and hull volume can be reduced, although this has presented it own problems. It limits the amount of space in the bilge to install the foil and provide enough separation between the upper and lower bearings which enable it to ‘slide’ under load when the yacht is at speed.

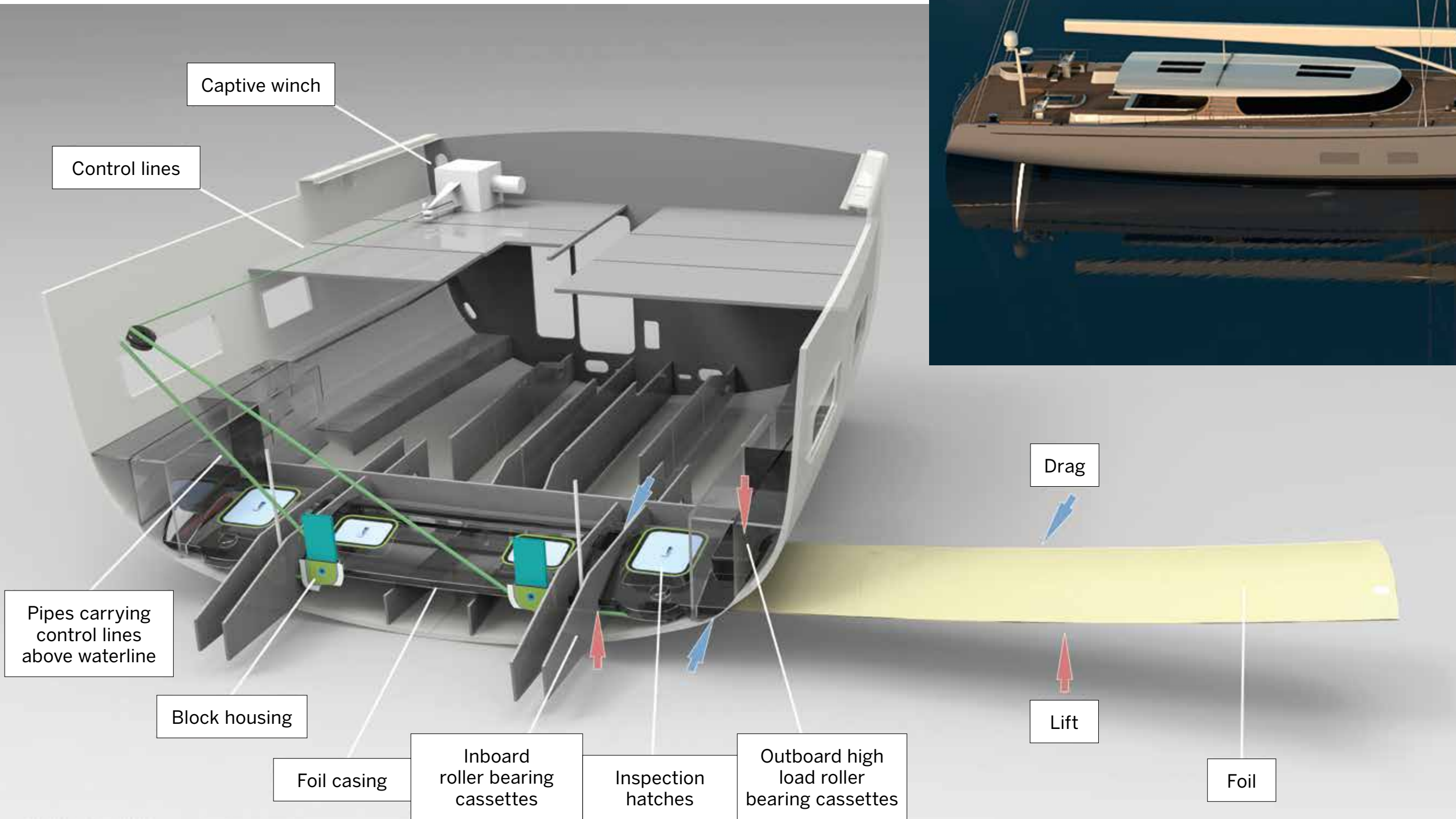
Simon Everest from Gurit said: “We collaborated with Baltic Yachts to make small adjustments to the accommodation and with Farr Yacht Design to alter the hull shape creating a subtle blister around the foil exit.”

The blisters provided the width or beam they were looking for.

The foil is controlled using a system of pulleys the lines for which run to a powerful electric captive winch positioned at deck level. To prevent water ingress from the casing, which is permanently flooded, the control lines are led through composite pipes to a point above the waterline (see diagram on following page).

The actuator or control lines travel to the outer extremities of the foil to a turning block so another challenge was to design a protective channel





or groove on the underside of the foil to carry the line.

A self-activating lock to prevent the board sliding straight through the casing in the event of the actuator line failing also had to be developed.

America's Cup research

There are four sets of bearing cassettes, the outboard, upper pair taking the upward loads when the board is deployed and the inner,

lower pair dealing with the downward load at the inner end of the board.

A lot of the bearing technology has been provided by the team at Ben Ainslie's BAR Technologies whose research into friction is literally microscopic in its methodology and benefits from more than two-and-a-half years' work on America's Cup boats. What BAR found during that research was that reducing friction to an absolute minimum was paramount.

That might sound obvious, but when the microscopic behaviour of materials such as carbon fibre was studied it was found wanting in certain parts of the design.

For instance, the trailing edge of the foil becomes so heavily loaded against the casing aperture when the yacht is sailing at speed, the surface of the carbon fibre foil distorts.

"It's as if it's pushing against a little hill of material created temporarily by

the loading – in other words it's constantly 'going up hill'," explained Simon Schofield at BAR Technologies.

So to reduce the size of 'the little hill' and in turn reduce friction, the trailing edge is finished with a much harder material, in this case titanium.

Each case of bearings contains four cassettes made up of 25 Torlon rollers. They are contained in titanium housings that can be adjusted (with the yacht at a standstill) to alter the angle

they meet the foil surface. We got some idea of their size when we were told each bearing set weighs 30kg.

The foil itself is being built by French specialist fabricators ISOTOP and comprises a number of carbon fibre spars running the length of the foil that are wrapped and held together with carbon cloth. The foil is designed to deflect through 800mm at each tip and the leading edge is finished with a foam 'nose' designed to crush in a collision.



The future of fast cruising?
The Baltic 142 will be able
to sail at over 20 knots
with much reduced heel

TECHNOCULTURE

The all carbon composite Baltic 142 is intended for fast, comfortable global cruising, but her owner hasn't stopped at foil technology in his quest for innovation. This yacht will be fitted with a diesel electric propulsion and generating system which burns less fossil fuel, is less space hungry and quieter than a conventional drive train.

Weight is being saved by specifying a 700-volt electrical system that uses lighter cabling and allows equipment normally run on heavy and space hungry hydraulics to be powered by the main battery bank.

The machinery room, housing the remarkably compact 400kW propulsion motor, two 210 kW generators, four banks of Alkasol lithium-ion batteries, watermakers and other ancillary equipment, has been assembled outside the yacht in Baltic Yachts' Jakobstad facility and has recently been craned into position as a complete module.

There has also been a major effort to improve serviceability so that long periods of independent cruising can be undertaken and maintenance carried out without having to seek out a specialist yachting facility.

With styling and interior design by Lucio Micheletti and Baltic Yachts, the 142 sports a sleek, low deck saloon with a hard, fixed bimini extending over the forward cockpit area. Below, her vast deck saloon, providing panoramic views, forms the focal point of her luxury accommodation. Unusually, the owner's suite is located almost amidships, where motion is at its least, with further accommodation for six guests in three cabins.

Other features include a Rondal rig with electric in-boom furling, a lifting keel and a propeller leg rotating through 180 degrees.